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ABSTRACT

This report of the conference on low-cost sports halls, sponsored by the Council of Europe, is divided into two sections: technical studies and conclusions. The introduction to the report provides an overview of the long-term program of the Council of Europe with regard to sport for all and a discussion of multipurpose sports halls. Sociocultural, technical, and economic aspects are considered in section I, "Technical Studies." Under sociocultural aspects, the functions of sports halls in society and the use of sports halls by persons who are not members of sports organizations are discussed. The technical aspects of sports halls which are treated include measurements, lighting systems, environmental conditions, acoustics, and floor materials. Economical building methods and management models are also considered in this section of the report. Section II includes the conclusions of the conference and an assessment of the conference. (HMD)

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Council of Europe

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

SPORT FOR ALL

LOW COST SPORTS HALLS

1972

The Council of Europe was established by ten nations on 5 May 1949, since when its membership has progressively increased to seventeen. Its aim is "to achieve a greater unity between its Members for the purpose of safeguarding and realising the ideals and principles which are their common heritage and facilitating their economic and social progress". This aim is pursued by discussion of questions of common concern and by agreements and common action in economic, social, cultural, scientific, legal and administrative matters.

The Council for Cultural Co-operation was set up by the Committee of Ministers of the Council of Europe on 1 January 1962 to draw up proposals for the cultural policy of the Council of Europe, to co-ordinate and give effect to the overall cultural programme of the organisation and to allocate the resources of the Cultural Fund. It is assisted by three permanent committees of senior officials : for higher education and research, for general and technical education and for out-of-school education. All the member governments of the Council of Europe, together with Greece, Finland, Spain and the Holy See which have acceded to the European Cultural Convention, are represented on these bodies. [1]

In educational matters, the aim of the Council for Cultural Co-operation (CCC) is to help to create conditions in which the right educational opportunities are available to young Europeans whatever their background or level of academic accomplishment, and to facilitate their adjustment to changing political and social conditions. This entails in particular a greater rationalisation of the complex educational process. Attention is paid to all influences bearing on the acquisition of knowledge, from home television to advanced research ; from the organisation of youth centres to the improvement of teacher training. The countries concerned will thereby be able to benefit from the experience of their neighbours in the planning and reform of structures, curricula and methods in all branches of education.

Since 1963 the CCC has been publishing, in English and French, a series of works of general interest entitled "Education in Europe", which record the results of expert studies and intergovernmental investigations conducted within the framework of its programme. A list of these publications will be found at the end of the volume.

Some of the volumes in this series have been published in French by Armand Colin of Paris and in English by Harrap's of London.

These works are being supplemented by a series of "companion volumes" of a more specialised nature, including catalogues, handbooks, bibliographies etc, as well as selected reports of meetings and studies on more technical subjects. These publications, to which the present study belongs, are also listed at the end of the volume.

General Editor :

The Director of Education and of Cultural and Scientific Affairs, Council of Europe, Strasbourg (France).

The opinions expressed in these studies are not to be regarded as reflecting the policy of individual governments or of the Committee of Ministers of the Council of Europe.

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1. See back of cover.

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SPORT FOR ALL

LOW COST SPORTS HALLS

Council for Cultural Co-operation
Council of Europe
Strasbourg
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FOREWORD

The Council for Cultural Co-operation's course on sports halls, held in Amsterdam from 12 to 16 October 1970, is part of the series of courses on low-cost sports facilities which began with the Cologne course on low-cost swimming-pools. [1]

Indeed, as part of its efforts to promote *Sport for All*, the CCC decided to pay particular attention to low-cost sports facilities which form the essential infrastructure enabling increasingly wide sections of the population to engage in physical exercise.

By systematically organising the exchange of information and the pooling of experience in this field, it should be possible for European co-operation to make its contribution to the construction of the best facilities at most advantageous cost.

The theme of this publication was also the theme of the course organised by the Netherlands Government in Amsterdam from 12 to 16 October 1970. [2] The government had set up a preparatory working party under the chairmanship of Mr. G. Ruychaver, Head of the Sports Facilities Section of the Netherlands Sports Federation. The General Rapporteur for the course was Mr. D.H. Schmüll, *Algemene Sportleider van de Gemeentelijke Universiteit te Amsterdam.*

The conclusions of the course were drawn up on the basis of guidelines prepared by the General Rapporteur. These were discussed by lecturers, discussion leaders and Rapporteurs at a preliminary meeting in Zeist (Netherlands) in March 1970.

Their main points were as follows :

— the discussions and reports were to concentrate on three aspects : socio-cultural, technical and economic ;

— these aspects were to be related to five categories of people listed below whose requirements were considered decisive where any sports hall was concerned :

- the public using it,
- the instructor working in it,
- the architects and builders erecting it,
- the manager running it,
- the public authorities financing it.

— the above aspects and requirements were also to be linked up with the main ideas expressed in the lectures.

Of course other approaches would have been possible but this one was considered vital as it also enabled the discussion groups to reach the necessary conclusions more efficiently than by giving random information from the 20 countries represented ; indeed the situation varies so much from country to country that fruitful discussion would have been impossible.

The conclusions of the course were discussed by working parties and then adopted at a plenary meeting. They are reproduced in Part II of this publication together with the report published by the Council of Europe under the reference Doc. EES (70) Stage 52,5.

Part I of this publication includes the full text of lectures given at the course.

In view of the great interest of the subject-matter, the Council for Cultural Co-operation felt it would be useful to issue a publication containing both the lectures and the conclusions adopted at the close of the course for the benefit of those responsible for the planning, building and running of sports halls.

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1. An account of this course, which was organised by the Government of the Federal Republic of Germany in Cologne from 26 to 30 September 1967, is contained in an earlier CCC publications : *Sport for All - Low-cost Swimming Pools* (1970).

2. The list of participants of the Amsterdam course is given in the Appendix.

INTRODUCTION

1. SPORT FOR ALL : A LONG-TERM PROGRAMME OF THE COUNCIL OF EUROPE [1]

In the course of a lecture he delivered at the symposium on *Sport for All*, which took place in Strasbourg from 14 to 16 September 1970, Mr. David Munrow, the distinguished British sport sociologist, stated :

"It has always struck me as rather strange that, in the so-called advanced communities and affluent societies, the suicide rates are generally markedly higher than in the poor or less advanced countries." Then, after quoting some figures taken from the 1965 *Demographic Yearbook*, he continued : "It is as if in those places where life is hard and at times apparently hardly worth living, people hang on to it grimly ; and in those places where the fundamental conditions of existence should make life tolerable, more people choose to reject the life which they experience."

However contradictory it may appear, this observation is nevertheless founded on fact and while one may have some reservations as regards the interpretation of the statistics, Mr. Munrow's comment certainly reflects a certain failure on the part of societies with high living standards where the fundamental needs of human beings are concerned. Such societies are essentially industrialised societies where economic preoccupations with profit, productivity and efficiency predominate and many an occupation has lost its meaning largely due to automation. But, as Simone de Beauvoir says, "there is no more odious way of punishing a man than by forcing him to perform acts which are deprived of their meaning". [2]

It is therefore essential that the planners of future society should be prompted in their undertaking by primarily humanistic ideas in order to furnish the man of tomorrow with a life-setting in which all his potential can be fulfilled and his personal dignity respected ; for man must remain master of the social machine : it is not a question of adapting man to his environment but of creating an environment which is suited to man and worthy of man.

Another by-product of our so-called developed societies is a sedentary way of life. Although all the necessary research has not yet been carried out, it seems clear that lack of physical exercise is a real threat to the constitution and hastens its decline. It is not natural to stay sitting down the whole day long, merely exchanging the car-seat for a seat in an office which is reached by lift, and it is equally unnatural to remain standing for long hours behind a counter or a machine. The body is made for movement. All this was masterfully expounded by Professor Per-Olof Astrand of Stockholm at the European symposium in Strasbourg mentioned earlier. Statistics show that in industrialised societies, lack of physical exercise is responsible for more illness and death than infections and cancer.

It is to these vital problems now facing the individual and society alike that *Sport for All* is trying to provide an answer.

What is meant by *Sport for All* ? It is a new concept of sport which, if it reaches out to the majority of individuals, should serve to improve man's living conditions in society. It is a concept which is gaining tremendous ground in all the industrialised societies of the world, in Europe and elsewhere, and it is greatly to the credit not only of many governments but of many sports federations that they have done their utmost to put the idea into execution. Some shining examples of this are the TRIM campaigns in Norway, the Netherlands, Sweden, the Federal Republic of Germany and, shortly, in Denmark, the *Contamos contigo* campaign in Spain and the *Sport-biennale* in Belgium.

The medical and biological argument should be enough in itself to convince all parties concerned of the need to give vigorous support to *Sport for All*. Such efforts will also pay financial dividends—as many member countries have realised—because they will make possible substantial cuts under the headings of public health and social security.

However the purpose of *Sport for All* is not confined to this single aspect and indeed extends far beyond purely physical considerations. *Sport for All* also provides a partial answer to the problem

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1. Text of the introductory address given by Mr. Gérard Herberichs, a Principal Administrative Officer at the Council of Europe
2. *Pour une morale de l'ambiguité.*

referred to earlier, in that it can make an essential contribution to the development and expression of personality, and to the safeguarding of the human element in a mechanised society.

Sport can mitigate some of the drawbacks of life in a mechanised society because it fulfils two important needs :

(*a*) it can help to free man from the isolation to which he is increasingly condemned. As a social animal, man has a vital need to communicate with others, and in order to expand his personality he needs the warmth of human relationships which he no longer finds under current working and living conditions ;

(*b*) sport also gives man an opportunity for self-expression and creativity in play. Analysing the essential characteristics of the phenomenon of play in his book *Homo ludens*, Huizinga concludes firstly that play is voluntary. There is a certain affirmation of individuality in the act of participation.

Secondly, play takes place at a specific place, at a specific time and according to specific rules, all distinct from the everyday world. Huizinga accordingly concludes that "into an imperfect world and the disorder of life, (play) introduces a temporary and limited perfection".

Lastly, play can provide still further relaxation, because for the tension of living it to some extent substitutes another tension of its own which diminishes as one's standard of play improves. To the satisfaction of success is added that of having been oneself the cause of that satisfaction.

These ideas are very important from the psychological point of view and explain the full value of sport as an ideal element of a socio-cultural policy.

It is moreover striking that the need for *Sport for All* has been experienced more or less simultaneously in the majority of industrialised countries, in Eastern and Western Europe, the United States, Australia and Japan, where physical fitness campaigns have been under way for some years now.

These are some of the reasons which prompted the Council of Europe to set aside part of its programme of activities for the promotion of *Sport for All*.

The Council of Europe is in fact the intergovernmental organisation which brings together the greatest number of European countries and has an essentially humanistic function to fulfill. The title of its work programme alone—"Man in the European environment"—is significant. This function is apparent in most of its spheres of activity, amongst others the European Convention on Human Rights, the Social Charter, or its policy of socio-cultural development.

At the end of 1966, the Council for Cultural Co-operation adopted *Sport for All* as the long-term objective of its programme for sport, physical education and open-air activities. As a result of this decision, a variety of work took place at different levels—experts, non-governmental organisations, Secretariat, Committee for Out-of-School Education—to finalise the outlines and the fundamental concept of *Sport for All* and to define the Council of Europe's tasks in this field.

The Consultative Assembly then gave the subject its attention and in January 1970 adopted Recommendation 588 in which it requested the Committee of Ministers to invite the governments of member States of the Council of Europe :

(*a*) to launch or support, at national level, *Sport for All* campaigns such as already exist in some member countries ;

(*b*) to encourage, if they do not already exist, the creation of national co-ordinating structures for that purpose ;

(*c*) to provide the Council of Europe with co-ordinating machinery to promote *Sport for All* on a European scale.

On the basis of the work previously accomplished and of the Assembly's recommendation, the guidelines of a European policy of *Sport for All* were established during the European symposium which was held in Strasbourg from 14 to 16 September 1970.

The implementation of this policy will, in the last instance, be in the hands of the appropriate governmental or non-governmental bodies of member countries.

The Amsterdam course falls within the framework of this policy, for its conclusions should help the organisations responsible for putting *Sport for All* into effect in member countries to solve one crucial problem in any policy aimed at extending sport, namely that of sports halls.

2. MULTI-PURPOSE SPORTS HALLS [1]

by Mr. L.B. van Ommen, Deputy Director General of Adult Education and Leisure, Ministry of Cultural Affairs, Recreation and Social Welfare, The Hague.

In the past three years a lot of time and effort have been spent by experts in the field of physical education and sport as well as in the field of construction and architecture on the building and construction of low-cost sports halls. I dare say that we have made some progress in the Netherlands on this matter, progress which may also be attributed to the initiatives from private enterprise and more in particular to original ideas from the construction companies.

It is high time, I think, for official circles to utter appreciation for the work they have done. However, the closer look you take at a certain subject the greater number of imperfections you notice.

If perfection can be achieved ! The fact that so many experts from other European countries came to Amsterdam, all of them, of course, with a lot of experience, makes me believe that this course—the first as far as I know dedicated to the construction of low cost sports halls in Western Europe—may well be considered as an important step towards this perfection.

The idea pervading the lectures and underlying the discussions during this Council of Europe seminar is that of *multi-purpose* sports facilities, with the emphasis on "multi-purpose". Actually, it is not in the least surprising that the "multi-purpose" idea should be uppermost in the minds of those who concern themselves with sport ; after all, the "multi-purpose" principle has been operative in other sectors of our modern society for some considerable time. Think of the supermarkets, where you can buy practically anything from matches to motor cars, from lipstick to lamb cutlets, from handkerchiefs to holidays abroad. I am quite sure there are many more ways as yet untried of putting the "multi-purpose" principle into practice in the commercial sector. It may be both interesting and useful to consider what factors have given impetus to the adoption of the "multi-purpose" principle.

A major consideration is the saving in *time*.

Modern man has more spare time than his forefathers had, but, paradoxical though it may seem, he is always pressed for time, he is always in a hurry. Consequently, he wants to be able to buy in one place everything he has on his shopping list.

Another important consideration is *space*.

It is a comparatively simple matter to assemble the various articles and commodities the customer requires in one place and to offer him a wide range of prices and qualities from which to choose, *provided the requisite space is available*. Shortage of space is an almost universal problem nowadays.

A city, a town, in fact any community, must have room to "breathe" if it is to be a place fit to live in. Broadly speaking, town planning consists in relieving masses of concrete, bricks and mortar with lawns, some trees or shrubs, a stretch of water, gardens or a flower bed here and there. All these amenities take up space, space and still more space.

Recreational facilities also take up space and will take up more and more as the "spare time" society, the coming of which has been heralded in no uncertain manner, becomes established as our way of life.

Indeed, recreation looms large among man's immediate problems. Man's leisure activities have become so important that they are beginning to affect employment unfavourably as well as favourably. Sport must necessarily have a large place among man's leisure-time activities. So much has already been said about the ill effects of the lack of physical exercise occasioned by the rapid development of innumerable labour-saving devices that I need not dwell on the subject here. The steep rise in the number of people suffering from cardiac and vascular diseases speaks for itself.

On the other hand, it is heartening to see that people generally are becoming more and more interested in sport, not merely in watching it but in taking part in it themselves. Can it be that man is heeding the warning, is subconsciously seeking to compensate for the sedentary, pen-pushing, button-pressing, lever-pulling, wheel-turning life he is being forced to lead, by deliberately indulging

1. Text of the opening speech, delivered on behalf of the Minister of Cultural Affairs, Recreation and Social Welfare.

in physical exertion or physical recreation ? Can it be that he is beginning to realise that he will literally have to *do something* if he is to survive and keep fit ? However that may be, it is incumbent upon the authorities to supply his needs or at all events help him to help himself.

One of the ways in which we can help him is to provide the requisite accommodation and facilities. Indoor accommodation is what is mainly required in Holland, where the climate is unsuitable for many outdoor sports for much of the year. Time and space are again the two factors that compel us to adopt the "multi-purpose" principle when planning new sports facilities.

But there is a third argument, perhaps even more cogent, in favour of adopting the "multi-purpose" principle, and that is that we must provide recreational facilities for families.

The accelerated rate at which young people are reaching maturity, their parents' attitude towards this early maturity and the emancipation of working women have permeated many families, the smallest units of society, with an atmosphere of complete liberty. The father no longer dictates or even conditions the manner in which the other members of the family spend their leisure time. Nevertheless, there is a tendency nowadays to involve the family as a unit in the "enjoyment of freedom", albeit on an entirely voluntary basis. "Freedom of choice" is becoming axiomatic in matters of sport that involve both the individual and those united as members of sports clubs. This is evident from the efforts being made to offer members the widest possible choice of sports and games.

A multi-purpose sports hall is a hall in which a number of sports can be practised, either at different times or simultaneously. The problem of space has been overcome in the sports halls being built in Holland. The time factor and recreation for families are problems that have not yet been solved. The ideal solution might be to set up "omni-recreational" centres offering each member of a family an optimum choice of recreation, including sports and games, under one roof.

If we subscribe to the almost universally adopted view that the family, the smallest social unit in our modern world, should be nurtured, I think we shall have to consider seriously the idea of "omni-recreational" centres. Once they have been established, it would seem a very short step indeed to what I should call "recreation supermarkets", where we could listen to concerts and see exhibitions of pictures, as well as make a choice from among a number of sports and games.

I understand that the theme of the Amsterdam course is limited to the multi-purpose sports hall and the requirements it is expected to fulfil. I think this is a sensible thing to do, because we must not let our enthusiasm run away with us. On the other hand, we must put our knowledge and experience to good use and go ahead with practical projects.

It is my hope that great benefit will be derived from the results of the work done during this Council of Europe seminar.

PART I

TECHNICAL STUDIES

A. SOCIO-CULTURAL ASPECTS

1. **The sports halls' function in society,** by S. van Gelderen
2. **The use of sports halls by persons who are not members of sports organisations,** by E. Kupers

1. THE SPORTS HALLS' FUNCTION IN SOCIETY

by S. van Gelderen

I think we can assume that everyone today is convinced of the desirability, of the vital need for man in modern society to take part in some form of sport.

Mechanisation and the increasing automation of production means that little physical effort—and usually very monotonous effort at that—is required of the worker of today. At his work, man, the whole man, functions to but a modest part of his capacity, and many of his organs remain completely idle. It is a law of nature, however, that every human being must exert itself if it is not to degenerate. Indeed, one can even go so far as to say that the quality of the bodily system depends on the degree to which it functions.

If work requires too little physical effort of modern man, the obvious solution is that he should seek compensation in his leisure time in activities that will keep him in good physical condition. But is that solution obvious to modern man ? Are children taught at school that sport is an essential supplement to work ? Do people realise that the modern production processes that bring so much prosperity in their train are also accompanied by a very real threat to the health of the individual and to the mental and physical powers of the nation as a whole or at any rate of certain groups ?

We may assume that our countries' leaders are aware of these dangers. We may also assume that their efforts are directed towards making the lives of those they govern healthy and happy, and that they do not think solely in terms of material prosperity but also of physical and mental well-being. This places a heavy burden on the shoulders of those in authority. Every effort has been made to improve the machinery of production. In almost every country we see the modernisation of agricultural methods and the intensification of industry together with large-scale investment. This is all happening so quickly that one wonders whether the consequences are being considered or will always be controllable. What immediately comes to mind in this context is air and water pollution, a highly dangerous side-effect of the headlong rush towards greater material prosperity.

But do money and spending power make people happy when their health is so poor they can't enjoy the things money can buy ? Or is the proverb "Money is the root of all evil" no longer valid ?

The drive for greater prosperity is an essential part of the policy of every government, but it should be considered in the context of a welfare policy aimed at creating conditions under which people can live and work happily. In the welfare sector, governments formerly confined themselves to questions of work and working conditions. Systems of vocational training were introduced, so that people would have every opportunity to feel equal to, and happy in, their work. Regulations governing working hours and conditions were brought in. Many other social measures were applied, almost all relating to employment.

But we should consider whether, while shortening working hours, governments are paying sufficient attention to the consequent increase in leisure time. If not, there may be unfortunate consequences. Let me give you an example. In the years following the first world war, working hours were drastically reduced. The immediate result of this was that men flocked to the pubs and consumed excessive quantities of alcohol, a reaction largely due to the lack of facilities for spending their free time in any other way. This in turn resulted in a variety of private enterprise aimed at providing other facilities. Outdoor recreation was catered for in the form of allotments, playgrounds, sports fields, swimming-baths and parks ; while the cinema became the principal form of indoor entertainment.

It was only after the second world war that public authorities, frequently in response to pressure from parliament, started making really serious efforts to provide facilities for the leisure-time activities of the great mass of the population, which now had free time at its disposal. Proper facilities for spending free time in a suitable and enjoyable way were no longer the privilege of the few who had the money to pay for it.

Large numbers of working men and women began to form associations and, not having themselves the necessary capital, called on the authorities to provide facilities whereby they too might spend their free time in a worthwhile manner. The facilities that they demanded in this way were too numerous to mention and their variety was enormous. If a list had been drawn up town by town, region by region and country by country, its length would have been so appalling that the natural reaction would probably have been to tear it up and do nothing. So perhaps it is just as well

that it was the municipalities—the smallest administrative units, which are closest in touch with people's demands—that made a start on providing leisure-time facilities.

1. *Are the resources of the municipalities sufficient for them to provide their residents with the desired facilities ?*

Generally speaking, the answer to this question must be in the negative. In most cases the municipalities have to depend on contributions from higher authorities, from trade and industry and from private persons. There is little chance of providing everything that is required at once.

The first thing municipal authorities should do, after drawing up an inventory of requirements, is to establish a list of priorities. This is in itself extremely difficult. In order to avoid a subjective approach, it is absolutely essential to proceed on the basis of certain guiding principles. Since it is public funds that are being spent, those principles must be based on the interests the community wishes to serve by providing the facilities.

First and foremost, it must be quite clear that the facilities will promote public health, and by health I mean both mental and physical health.

Secondly, the wishes of a large sector of the population must, as a general rule, prevail over those of any smaller group. Thirdly, the fulfilment of some demands must not prevent the provision of facilities in other fields. Fourthly, economic considerations should prompt the provision of facilities of which optimum use can be made, possibly by different groups of users. These are just a few of the main guiding principles ; what I wish to stress is that the approach must be strictly objective if priorities are to be established in a proper manner. It is particularly important that "status symbols", facilities on an unnecessarily grand scale, be avoided.

Once a certain order of priority has been established by the municipal authorities—and the same applies at the regional and national levels—an endeavour should be made, in terms of available resources, to draw up a schedule of requirements which the proposed facilities are to fulfil, whether they be intended for adult education, youth work, sports or week-end recreation etc.

Up to now I have dealt only with recreational facilities in general, but we are concerned with sports facilities and sports halls in particular. I shall therefore now address myself more directly to this subject.

2. *Do the municipal or higher authorities have enough "know-how" to draw up a sound schedule of requirements which the various facilities have to fulfil ?*

The bigger the area administered, the more elaborate the machinery of government and thus also the greater the likelihood that professionals in many fields will be on the spot for consultation. But, as has already been pointed out, it is precisely the small administrative units that concern themselves least with providing facilities. The likelihood that there will be enough experts to draw up a balanced schedule of requirements for a sports hall, for instance, will be directly proportionate to the number of inhabitants in a given area. It is therefore most important that politically responsible administrators are afforded the opportunity of consulting, where necessary, skilled professional advisers.

Advice bureaux, run by various institutions, have already been set up in several countries. To give you a few examples : in West Germany there is the *Übungsstätten-Beratungsstelle* of the *Deutsche Sportbund* in Cologne ; in France there is a bureau run by the *Secrétariat d'État auprès du Premier Ministre chargé de la Jeunesse et des Sports* and in the Netherlands a bureau run by the Union of Netherlands Municipalities. Whoever gives the advice, whether it is a government office or a private institution, here too we must be sure that such advice is objective, that as many interests as possible are taken into account, and that no exaggerated demands are formulated that are only of interest to a small sector of the public. Any inquiry conducted into the needs and wishes of the public should be carried out by persons who are properly qualified to do so. When the inquiry concerns the proposed building of a sports hall, they must realise that the activities promoted in sports halls should serve *to improve health and social conditions,* fulfil a socially educational function (permanent education) and can be very useful in promoting *integration* (young with old, newcomers to a neighbourhood with established residents).

They must also have certain facts at their disposal such as the possibilities of including a sports hall in local urban development schemes as well as the anticipated changes in the number of inhabitants, age structures, composition of the population etc.

3. *How should the public's needs be assessed to provide the basis for a sports hall's schedule of requirements ?*

A team of experts approaching the problem from the viewpoints of different disciplines should collect the basic data.

A *social geographer*, with his knowledge of town planning, should supply data of importance for the correct siting of the sports hall, for instance in relation to the widest range of users or possible traffic.

A *sociologist* should collect data on population growth, age structures, professions and occupations etc. of importance when it comes to deciding the capacity of the sports hall. It is, after all, of great economic importance to take future development into consideration when building a sports hall which requires considerable investment. Too many amenities have already proved to be too small on the day of their opening.

A sound guideline would be to think in terms of the needs in fifteen to twenty years' time ; during the first half of the amortisation period the hall would then be more than adequate for its purpose, and during the second half, with the continually increasing demands made on it, it would gradually reach saturation point.

A *sports expert* should, preferably at a special hearing attended by all the interested sports groups, be able to ascertain the needs of such groups. Even at this early stage of the preparatory work he should be in a position to rationalise any either exaggerated or over-modest demands by future users.

In view of the present shortage of sports halls, it would be wise to collect data not only on present membership figures of sports clubs but also on waiting-lists of those who have not been admitted for lack of facilities. The latter figures should give a good idea of latent needs which often only become apparent once the sports hall has been built.

A *physical education instructor* should indicate to what extent schools may wish to make use of the sports hall for physical education classes requiring a large hall. Clearly schools should be allowed to use the sports hall for physical education providing there is sufficient space available. An inquiry conducted along these lines will yield a wealth of data :

(*a*) which sports will be practised in the sports hall ;

(*b*) the number of active and potential participants ;

(*c*) the period of use of the hall, for instance, two months, the winter season or all the year round.

Only after all such data have been collected can a schedule of requirements be drawn up.

4. *Who should have a say in drawing up the sports hall's schedule of requirements ?*

Here again a multi-disciplinary team of experts should decide the matter jointly. The collaboration of the following groups is essential :

(*a*) users—able-bodied and handicapped—active and passive ;

(*b*) sports leaders—instructors and organisers ;

(*c*) builders—architects and technical advisers ;

(*d*) managers ;

(*e*) government officials—at local, regional and national level.

They all have a contribution to make if a socially sound structure is to be achieved. If one or more of these groups is not consulted, there is a risk of building a sports hall which will be uneconomic and inefficient.

5. *What is the motivation of users of sports halls ?*

The answer to this question might be short and to the point : *pleasant and worthwhile recreation.*

But this immediately raises another question : what *is* pleasant and worthwhile ? Everyone has his own ideas about that, and will of course join a group of like-minded people. In this way we get different groups, all seeking, in their several ways, pleasant recreation and with different ideas on what is worthwhile and what is not.

In sports halls, then, we find several groups of users who go there from very different motives. Top-level sports competitors expect the sports hall to conform to international technical requirements. Only the slightest deviations from the prescribed dimensions will be accepted. The highest standards will be demanded for the floor and lighting, temperature and ventilation. The same applies to the secondary facilities. Such athletes consider it quite normal for there to be a sauna bath and massage rooms in addition to the usual sanitary facilities. Accommodation for spectators is also a point of importance for this group, for without spectators they would be deprived of much of their pleasure.

It is, in fact, a good thing that high-level sport attracts spectators to sports halls. There is thus a certain interaction, which might make it possible to find out to what extent the requirements of top-level competitors could be met. It should be possible to calculate, from the entrance fees paid by spectators, how much more could be invested in sports halls for the benefit of this group, over and above the cost of building and running spectator facilities.

It is doubtful whether every sports hall should have to come up to these extreme standards. A big city or a given region could manage with just one or two such halls. By this I do not mean that all the requirements concerning dimensions and technical equipment should not apply to other sports halls. They, too, must have standard-size basket-ball pitches and tennis courts. But the great majority of people who play games solely for recreation, though they too may often play matches, at a lower standard which therefore attracts little or no public interest, make more modest demands. They are content with much less costly facilities. For them the important thing is not sporting achievement but rather the pleasure of some physical activity in company with others. Their motivation is more in the nature of : "I want to stay young", "I want to lose weight", "how can I avoid heart trouble ?", "how can I meet that attractive young woman or the people in the neighbourhood I've just come to live in ?"

They will, however, appreciate having reasonable changing-room and washing facilities and somewhere where they can meet and chat afterwards. For this group the sports hall undoubtedly fulfils a social function and should therefore provide premises which can be a meeting-place. These premises should sell drinks and also be for the use of spectators, rather like the foyer of a theatre.

If schools are to use the sports hall, it will have to come up to the standards laid down by the education authorities for physical education facilities. This means that the changing and washrooms will have to be bigger than would otherwise have been necessary, since classes of schoolchildren are usually bigger than a group of adults taking part in some form of sport.

In most of our countries the handicapped also take an active part in sport. It is crucial for them that the sports hall should be built in such a way that they can practise sport without having to be helped. The most important thing is that they should feel as normal as possible.

A sports hall is also used by groups whose main aim is to keep fit. In the Netherlands, for instance, there are many "keep fit" classes for housewives and others who are not members of any sports organisation which use sports halls for pleasant and healthy recreation.

Other experts will be dealing with this question and also with technical requirements later on, so I shall not go into it further here.

6. *What do sports instructors expect of a sports hall ?*

They, too, will want the sports hall to come up to international standards as far as possible. Moreover, if they are coaches, it is important that the hall should be suitable for training purposes, which means, above all, plenty of equipment such as extra baskets and plenty of balls for basketball etc.

If they are organisers, they will be more concerned with the hall's capacity, and if their clubs include competitive teams, they will be more interested in spectator capacity than in the number of teams that can play simultaneously. The most important point for them will be the ability to use the hall for a low fee. This they should be entitled to do, as long as they acknowledge that other users are entitled to do so too.

All groups who use the hall at a socially responsible level should be treated equally by the authorities. By this I do not mean that a badminton group such as the one I belong to should have the same rights as a volley-ball club competitive in the European Cup championships when it comes to deciding who should use the hall on the one free evening left in the week. In such a case my little group would have to content itself with hiring a gymnasium on Saturday mornings, even if it means we have to take our showers at home and the hall is only 5 ½ metres high. We shall be quite happy there without bothering about a sports hall. And we shall still feel we are keeping fit by taking this exercise.

7. *What is the builders' role in establishing the sports hall's schedule of requirements ?*

Architects and building experts should listen carefully to what the sports experts have to say. If they are to build something really worthwhile, they ought to know what the users expect of the hall and should preferably have had experience as users themselves. This applies to the demands of active participants and spectators alike.

In addition, they should bring their technical knowledge to bear on the discussions concerning the hall's requirements. They should explain the consequences, both financial and functional, attaching to the use of certain materials and technical installations. They should fully realise that they are working to order.

This does not mean that they should pay heed only to the public authorities and ignore everyone else's views. It is from the comments of the users, the sports instructors and the administrators that the architects can derive the information they need to perform their role as advisers on the building of so costly a project.

Lastly, it is up to them to get a clear idea of what is wanted at the planning stage. That idea should not be confined to the hall's external appearance nor to the growing amount to be invested in the building as the discussions progress ; on the contrary, their most important task is to keep the feet of the others firmly on the ground, to warn them of the consequences of some of their demands.

As long as it stands, the sports hall will be linked with their names, and it is therefore in their interests, and in the interests of all concerned, that a really sound edifice is erected.

8. *What do managers look for ?*

Here, too, totally different points of departure can lead to widely divergent opinions.

A manager who thinks purely along financial lines will give exclusive or prime consideration to the financial results of his management. He wants a sports hall which costs little and gives good returns. A—preferably large—credit balance is what he wants. His main object will be a full house and maximum takings from participants and spectators alike.

A manager from a catering background will regard every visitor to the sports hall as a potential consumer. He views sport as an activity punctuated by breaks rather than a continuous activity. He, too, wants to make money but in a different way. He will stress the importance of having a meeting-place with a bar.

Then there are the managers for whom order and cleanliness are of prime importance. They will insist that spectators and sportsmen be segregated as soon as they get inside the building to avoid trouble. They will want a hall that is easy to keep clean.

I could mention many other different types of manager, but I am more concerned with the context in which the manager should view his future task when the hall's requirements are being planned.

The most important point is that a sports hall should provide facilities for *Sport for All.*

A sports hall need not be a profit-making concern.

A sports hall need not be a cafe or restaurant.

A sports hall need not be a super-hygienic hospital etc.

Rather let it be a pleasant place where people can take exercise, watch matches and meet : we ask no more of it than that.

9. *What contribution can the public authorities' representatives make to the shaping of the hall's schedule of requirements ?*

It is these officials who are responsible for seeing that the different interests are fairly represented in the list of requirements. Their task extends still further. They must safeguard the interests of those who are *not* represented at the consultations by ensuring, for instance, that the project is not set up on too grand a scale. It is they, too, who must see that the special requirements of, for example, the handicapped, as both users and spectators, are taken into account. They should also regard themselves as keepers of the public purse, and be ever aware of the financial implications of both capital investment and running costs.

If financial backing from the authorities enters into the picture, they must make sure that the conditions of such grants are observed in the schedule requirements. All this may not seem too difficult a task, but it is perhaps these representatives who can best ensure that the sports hall will primarily have a social function. If the job is tackled along these lines, it can be expected that a balanced list of requirements will be drawn up for any given sports hall.

So far I have only mentioned two main uses of sports halls, namely the pursuit of sport and physical education for schools. This alone guarantees that the sports hall will be multi-purpose. Once the needs have been assessed and the hall's capacity determined, it can be decided whether sufficient space and time will be left for the sports hall to be used for other activities. If so, this raises an extremely difficult question.

10. *What other activities can be carried on in a sports hall in any remaining time available ?*

Up to now, everything in the schedule of requirements has centred on the needs associated with a number of sports and with physical education classes. Not only the dimensions of the hall, but its fittings as well, meet these needs. The floor surface, the air-conditioning, the acoustics and the lighting are all geared to the special demands of these groups of users. Every effort should be made to meet these demands within the framework of the financial resources available.

But what if the sports hall, with its specific structure, is to be used for plays, concerts, lectures and "beat" entertainments ? Requirements could be drawn up for each of these activities separately in the manner I have already sketched out for *sports halls*. It would then be seen that the many requirements were so widely divergent that the idea of housing all these activities in a single building would have to be rejected as impossible and unacceptable.

A number of halls have been built in various countries in recent years which are used for both sports and cultural purposes (plays, concerts etc.). They are usually called "multi-purpose sports halls". If you approach the various groups concerned in drawing up the schedule of requirements, you soon arrive at one of two conclusions.

Where the people who use the hall for sports are satisfied, those who use it for cultural purposes are either equally satisfied or else find the facilities inadequate. In the former case, the hall invariably proves to have been extremely costly to build and extremely costly to run. In the latter case, other activities have been pushed into the background, because too little was invested in the building, and the facilities are unsatisfactory. Where the people who use the hall for sports are dissatisfied, the schedule of requirements proves to have been altered in relation to secondary activities to such an extent that the hall loses its attraction from the sports point of view.

Only high additional costs can make a sports hall acceptable for use as a theatre, concert hall, conference hall etc. But the important question is whether the principle of combining sports and physical education with such activities as plays, concerts and dancing is compatible with the idea of "low-cost facilities".

Perhaps the solution lies in dispersing sports halls (in which several sports can be played) and concert and other halls so that full use is made of the amenities provided for these specific activities.

In our modern society in which everyone can get about easily (perhaps too easily), the dispersal of facilities of this kind over a somewhat wider area should not raise great objections. Even if this proved a drawback, it would be less serious than any significant departure from the schedule of requirements in the building of the hall.

In these pages, I have only touched on some of the aspects of the subject entrusted to me. I have endeavoured to pinpoint some of the responsibilities of the public authorities in this context. It will be for other experts in the ensuing studies to deal with the questions I have raised in greater detail.

2. THE USE OF SPORTS HALLS BY PERSONS WHO ARE NOT MEMBERS OF SPORTS ORGANISATIONS

by E. Kupers

In the next few pages I should like to develop the theme : leisure is a blessing for those who put it to good use, but a curse for those who have to kill time !

This is not the place to go into the reasons for the drastic reduction in working hours in the last fifty years. Suffice it to say that today the working population of many countries already enjoy four months' leisure a year.

It may reasonably be anticipated that in a few years' time the pattern of life will be made up as follows :

30 to 35 years of free time as against 30 to 35 working years, in contrast with the present 8 to 10 years of leisure as against 45 to 50 working years ;

40 working weeks per year as against the present 49 to 50 ;

30 working hours per week as against the present 45 to 48.

Taking our life as a whole, the number of working hours will drop from 100,000 to 40,000, which means that we shall gain 60,000 hours of leisure. But the great problem is that most of us have not learnt how to accept the precious boon of freedom to do as we like.

For centuries man has been taught to believe that work is healthy and that idleness is the root of all vices.

For centuries farewell speeches and funeral orations have praised the industriousness of the person in question.

However the increase in leisure poses not merely a social problem but a purely human one as well. The reduction in working hours has been made possible by the large-scale introduction of efficiency, mechanisation and automation.

In many cases this means that the worker—using the term as a general name for anyone who plays some part in the working process—can do his job with less and less physical effort. All the pushing and pulling, carrying up and down of heavy weights—in short, most of the activities which a few years ago were a normal part of a man's work—have been taken over by machines and are now done with the help of trolleys, lifts and other mechanical aids.

But the increased absence of physical work has created a new problem—lack of exercise.

Physiologists have taught us that movement is essential to the development of our organs. If movement—work—is dispensed with, many vital human organs which are indispensable for the proper functioning of the body will function less efficiently. What this actually amounts to is a deterioration of health as the alarming mortality rate shows. The growing incidence and mortality rate of cardiovascular disease due to insufficient bodily exercise is most disturbing.

Increased leisure can only result in a higher incidence of disease and a higher mortality rate unless leisure pursuits are found to compensate for this lack of physical exercise.

Is spare time a blessing ?

Or is it a curse ?

In choosing the subject of low-cost sports facilities, the Council of Europe has tried to make it quite clear that sports halls can really help to turn leisure time into a blessing, first, because they make leisure time pleasurable and enjoyable, and secondly, because they are a vital asset in combating lack of exercise.

But it should be emphasised that sports halls are only one of many means of making possible a real somatic use of leisure time.

According to the American psychologist Otto, man uses a mere 10 % of his creative potential in a lifetime. And his creative potential is endless : singing, dancing, painting, music, reading, drawing, games and so on. It is true that sports and games are an important part of many people's lives. In most countries 60 to 70 % of young people between the ages of 8 and 20 are members of

sports associations. Sport is an important feature of their lives but within a sports association it is primarily geared to performance, a factor inherent in the psychology of this age group.

By the age of 25, the desire for regular training disappears in many active sportsmen, and more attention is paid to social obligations—for example, to their families—and to other cultural interests. Serious sports associations are not interested in anyone over the age of 25.

But it is essential to fill this gap and turn the interest in sport and games these people have to good advantage in order to combat lack of exercise.

The withdrawal of adults from sports associations means that it is essential to offer them other alternatives which are suited to their physical needs.

These should fulfil and meet certain criteria as regards :

1. amenities,
2. activities,
3. instructors,
4. organisation.

Amenities

The sports hall is the ideal sporting amenity for the activities of age-groups of 25 and over. Indeed it can be used whatever the weather : rain, wind, cold and sun have no effect on the pursuit of activities. This is an extremely important factor in ensuring regular practice : people know they can always come.

Besides, when they have taken their exercise, the public lounge which is part of the sports hall affords an opportunity for social contact.

Activities

An overall area of around 1,000 square metres means that a sports hall affords scope for many different forms of sports and games. Everyone has their own favourite sport and sometimes an unaccountable dislike for others. Many will want to continue with a sport they played as youngsters, while others will become aware of other pleasant sports.

In addition to many well-established forms of sport such as basketball, volleyball, table-tennis, badminton, indoor hockey, football and handball, there are many other types of games which are classified as sport. They are usually grouped together under the heading of indoor games, and although simple forms of games, are elevated to the rank of sport because of their competitive element.

Music and movement should always be provided for women and eurhythmics are also a highly popular activity.

Many people seek a standard of achievement and the chance to perform. This can take the form of physical fitness tests or the mastery of a few simple gymnastic exercises (e.g. 10 pull-ups on a bar, two somersaults). The results are entered in notebooks which many people treasure.

Instructors

Instructors must be of high standard. They are expected to be experts, which means that they must be proficient in a wide variety of games and sports and possess coaching ability. They must also be organisers, helping people over their initial fears, giving suitable advice and encouraging them to join in games. They must also form games and exercise groups which play well together and are enjoyable. In other words, they must discreetly choose people to make up harmonious groups. Lastly, they must be cheerful and good-humoured with participants at all times.

From this brief summary it can be seen that preference should be given to professional instructors specially trained for the job, whose knowledge, skill and, above all, cheerful disposition will ensure that every hour of attendance is a pleasure for the participants who all come voluntarily. True, the pleasure will be mixed with plenty of weariness but also with plenty of sports and games.

Organisation

It is impossible to put forward a ready-made formula for all the activities mentioned above. Circumstances and possibilities vary from case to case. Besides, the set-up within a national or municipal system also varies to such an extent that one cannot do more than make a number of recommendations.

The main question here is whether the public authorities' responsibility is a direct or an indirect one. In many countries, they have deliberately agreed to the reduction of working hours while at the same time aware that they are also responsible for ensuring full employment.

Bernard Shaw put it very succinctly, and the European Festival of Recreation held in Geneva in June this year adopted his comment as its subject theme : "Mankind has admirably understood how to organise part of its life work, but it has neglected to organise the no less important second part, leisure."

It is the duty of public authorities to promote action concerning leisure occupations. Citizens rightly demand a suitable setting for a viable way of life and, in my opinion, the authorities are bound to meet their wishes to the best of their ability.

This can be done both by indirect and direct support.

Indirect support may take the form of making the necessary funds available to promoters of cultural activities for the over-25 age-group. One possibility here would be to contribute towards staff costs, for example, by paying the salary of a full-time professional instructor, and another to contribute towards the provision of low-cost sports facilities. It remains to be seen whether such indirect support by public authorities, which is certainly highly appreciated, is adequate.

It was stated earlier that the section of people interested in recreational sport is enormous —roughly 50 % of the population—and displays a number of characteristic features.

The first of these is a sense of independence. They do not like to feel that staying away, coming in late or leaving early will affect the way they are received. Such an attitude is totally unacceptable to a sports association. Indeed it would otherwise be doomed to certain defeat when it came to team sports.

A second characteristic is the wish to remain anonymous yet at the same time have the feeling that they are accepted for their skill and potential. In other words, they seek a setting in which they are regarded as consumers and the instructors act as the suppliers. The attitude and reactions of the clients—the "demand"—determine the "supply" of sports and games. Furthermore, by definition, the consumer likes to remain free of any commitment. Whether we like it or not, there are many sectors of society today which have a strong distrust of any form of organisation. People shy away from membership and in general have very little inclination to throw themselves body and soul into an organisation.

This mentality is probably the main characteristic of the over-25 age-group and current social attitudes. There is a gulf between the strictly disciplined and regimented sports associations and this vast group of men and women looking for physical exercise in a relaxed atmosphere. It would be wrong to expect the sports associations of today to be flexible enough to cater for those who want to enjoy recreational sport and whose approach is so different from that of ordinary athletes.

A second reason why sports associations are unsuited to this task is that they are geared to the 8 to 25 age-group. The characteristics of this age-group and their concentration on one particular branch of sport puts any adaptation out of the question.

A third reason is the enormous shortage of instructors in many clubs, associations and federations which have the greatest difficulty in finding volunteers who are prepared, and suited, to organise and supervise members in the 8-25 age-group.

The increase in leisure puts a great strain on voluntary staff. Young enthusiastic members with more time to practise their favourite sport need the attention of instructors. In my opinion, many more youngsters in the 8-25 age-group would join sports associations if more instructors were available.

It is clear from this rather incomplete summary that the organisation of games and sport for the large over-25 age-group cannot be shouldered by existing sports associations even should they be willing to do so.

As I said earlier, the participants themselves have little inclination to become involved in organisation. All they seek is a little exercise and enjoyment. Clearly therefore public authorities

have a task to fulfil here. First, because they consciously and willingly assume responsibility for the well-being of the public. Secondly, because physical and mental well-being is at present being threatened by the elimination of essential physical work. Thirdly, because the amount of leisure is increasing and it is up to the authorities to give the lead in ways in which people can make enjoyable use of these precious hours. Fourthly, because public authorities are a permanent feature of society and can therefore ensure the continuity of activities.

As I have already said, the most efficient form of organisation would be to appoint full-time professional instructors—trained, schooled and paid to direct activities. Participants would simply turn up and buy an entrance ticket entitling them to make use of the services and facilities available.

The most suitable setting would be a sports hall. There is room for many different activities and a timetable would have to be drawn up. Neither rain, wind, cold or heat would prevent the public from coming.

A few words about the financial side. Say the running costs of a sports hall = x units per hour, the cost of instructors = y units per hour, the equipment (balls, trampoline etc.) = z units per hour, and general overheads (caretaker, paper work, book-keeping) = so many units per hour. Now should these costs x + y + z be passed on to the public in toto or would it be feasible, in view of the great asset of sporting amenities to mental and physical health, to put up a subsidy per participant ? There is nothing revolutionary about a subsidy, since public authorities already heavily subsidise theatre and concert hall prices in order to encourage public attendance. The same applies to the sports sector.

The total costs of maintaining sports stadiums, for example, are certainly not covered by entrance money.

However, it might be feasible to make participants cover all the costs since the majority would be wage-earners.

If good publicity were used to convince people of the absolute necessity of looking after their mental and physical health, they would not balk at the financial sacrifice.

A final word about the relationship to organised sport. Indeed the principal users of sports halls are sports associations and it was for them that such amenities were provided in the first place. If the associations had to be deprived of the use of sports halls in order to cater for recreational sport, we should find ourselves in a sorry predicament.

Even now, in many member countries of the Council of Europe, scores of indoor sports associations have to put up with limited hours of use. For this reason it would be advisable to associate leaders of sports associations with the planning of recreational sport. Too many are quite unaware of the need to organise recreational activities for the over-25 age-group.

Leaders of organised sport must be made to realise by being actively drawn into such consultations, that the idea is not to undermine their work but to build and expand on the foundations which they themselves have laid with so much energy, devotion and perseverance. They too must learn that leisure is a blessing for those who put it to good use, but a curse for those who have to kill time.

B. TECHNICAL ASPECTS

1. **Measurements,** by J. de Bie
2. **Floors of multi-purpose halls,** by Walter Künzel
3. **Guidelines for a good lighting system,** by G. Hietbrink
4. **Environmental conditions in sports halls,** by E. van Gunst
5 **Acoustics in sports halls,** by H. Graner

1. MEASUREMENTS

by Mr. J. de Bie, BNA Architect

How are the Netherlands endeavouring to solve economically the problem of building sports halls ? In my opinion, independently of the architectural aspect, serious preparation and planning are essential for the achievement of anything satisfactory, since without them the desired financial and architectural results cannot be attained. Here, then, is the logical starting-point for this report.

1. *Introduction*

To keep the cost of building and running sports halls down to a reasonable level demands a policy providing for the co-existence of physical training, sport and recreation. In practice that means that no gymnasium, sports hall or swimming pool should be built except on the basis of the principle that physical training, sport and recreation form a functional whole. In principle, accordingly, no hall should be built purely for physical training, or for sport, or for recreation, but ideally for all of them together, which means that it has to be equipped for multiple and continuous use.

This is particularly important when it comes to halls for competitive sport, which require playing courts of an approved type, cloakrooms, showers, training rooms, massage cubicles, accommodation for the public etc. This equipment can be adapted to numerous purposes.

Nothing should prevent a school sports hall, for example, from being used for many different purposes, or as a recreation room, provided that it is fitted up accordingly, that the conditions are specified, that there are monitors, in short, that it is properly managed. Physical culture, competitive sport and recreational games ought to go hand in hand in the interests of all. This is the best way of avoiding any deficit in running costs.

2. *Why have sports halls ?*

It is clear that physical culture, sport and recreation are by definition open-air activities, provided that the air is clean. In the Netherlands, however, this statement has to be qualified because of a climate that makes indoor facilities essential. In addition, in our overpopulated country, indoor sport has become very popular, especially since 1950, and its popularity is still growing. Because of the climate, many outdoor sports are also played indoors : football, handball, hockey, tennis, basketball etc. Lastly, the spread of sport requires premises for training and keeping fit.

Owing to this trend, a shortage of halls and deficiencies in their equipment have been noted. It is accordingly being sought to remedy this by functional projects, where the possibility of multiple use is exploited to the full. Well co-ordinated consultation between the public and private bodies concerned is essential to achieve this result.

3. *Resources devoted to this purpose in the Netherlands*

It is our good fortune that public and private bodies have joined forces to find solutions to these problems. A Sports Halls Council has been set up, comprising representatives of :

— the Ministry for Cultural Affairs, Leisure and Social Action (Physical Education and Sports Division) ;
— the Union of Netherlands Municipalities (Physical Education and Sports Division) ;
— the National Advisory Council for Municipal Sporting Activities ;
— the Royal Netherlands Union of Physical Culture Teachers ;
— the Indoor Sports Union ;
— the Netherlands Sporting Federation.

Its terms of reference are as follows :

(*a*) to promote the building of gymnasiums and sports halls as well as of halls for combined physical culture, sport and recreational activities ;

(*b*) to investigate and encourage the application of standardised building methods with a view to reducing building costs ;

(*c*) to publish to this end reports on :

1. directives for the building and fitting up of sports halls ;
2. recommendations for the electric lighting of gymnasiums and sports halls ;

3. air-conditioning plant and technical apparatus ;

4. specially equipped premises for the physically handicapped ;

5. sport and the arts.

4. *The results achieved*

In 1960 there were in the Netherlands only 13 sports halls, built on traditional lines. The cost was some 2,000 florins per square metre of playing space (including cloakrooms, showers and technical equipment).

By 1970, the Netherlands had about 200 sports halls, some 50 having been built annually in recent years.

Standardised building methods having been strongly recommended, several firms have launched into building sports halls which, while offering the same facilities as halls in the traditional style, cost only about 700 florins per square metre of playing space (including cloakrooms, showers, other rooms and technical fittings) in spite of a 75 % rise in building costs since 1960.

The methods adopted in the Netherlands have thus resulted in an 30 % overall reduction in real building costs. It would accordingly seem that we are on the right track.

5. *How has this been achieved architecturally ?*

The Sports Halls Council, in agreement with sporting associations, has worked out a functional 4 × 7 metre building module.

In practice this module enables playing areas to be constructed which comply with the rules of national and international competitive sport. Instructions for its application, the dimensions of the sports halls it enables to be built and their various possible uses have been drawn up for building firms.

Terminology and measurements

Cf. "Nomenclature for gymnasiums and sports halls".

Type	Floor measurements in metres	Head-room in metres	Floor area in sq. metres	Possible sports
Enlarged gymnasium	13 × 22	7	286	badminton (1), volleyball (1), table-tennis (6), physical education and all indoor sports requiring only limited space
Enlarged gymnasium	16 × 28	7	448	badminton (3), volleyball (1), basketball (1), table-tennis (8), physical education and all indoor sports requiring only limited space
Sports hall	22 × 42	7	924	badminton (5), volleyball (3), basketball (1), tennis (1), indoor football (1), hockey (1), handball (1), physical education and all indoor sports requiring only limited space
Sports hall	28/29 × 42	7	1176/1218	badminton (7), volleyball (4), basketball (2), singles and doubles tennis-court, football (1), hockey (1), handball (1), physical education and all indoor sports requiring only limited space
Sports hall	28/29 × 48	7/9	1344/1392	badminton (9), volleyball (4), basketball (3), singles and doubles tennis-court, indoor football (1), hockey (1), handball (1), physical education and all indoor sports requiring only limited space
Hall for sports and other events	Measurements = a multiple of sports halls 22 × 42 or 28/29 × 42 or 28/29 × 48			Varied lay-out of play areas as for sports halls and for athletics
Sports stadium	Measurements usually determined by the built-in cycle-track (200 metres)			All lay-outs as listed for sports halls, cycling and/or athletics and/or skating

6. *Conclusion*

The Netherlands is endeavouring to solve the problem of providing sports halls at moderate cost by means of publicity to encourage firms to go in for this kind of building along the proper lines. The Sports Halls Council keeps contractors regularly informed by publishing all the latest designs.

If other European countries were to find this method a good one, it would be important in the first place to agree at international level on the measurements of courts and grounds for various indoor sports—in other words to reduce the present latitude as regards size. An agreement in this matter is particularly urgent since international sports meetings are becoming more and more frequent. It would be most valuable if the Council of Europe were to treat this as a priority matter.

2. FLOORS OF MULTI-PURPOSE HALLS

by Walter Künzel

I. *Introduction*

The floors of gymnasiums and sports halls have to fulfil a number of requirements—which should be specified before construction—based on the needs expressed by different groups of users in the light of a variety of athletic, educational, hygienic, orthopaedic, and economic considerations. The wishes of these groups do not of course always coincide ; each has its own specific requirements.

For the construction of specialised halls—e.g. gymnasiums or halls for ball games only—industry today offers a variety of products which can be adapted to specific uses without too much difficulty. However the difficulties are greater when it comes to multi-purpose halls, because different types of sport require specific, clearly differentiated flooring or surface qualities.

The problem becomes even more complicated when sports halls are used not only for a variety of physical exercise but also for meetings, theatrical performances, dances etc.

II. *Properties of floors for multi-purpose halls*

The problem of flooring in multi-purpose halls can be dealt with in a variety of ways. However, before listing the various possibilities, the main function of the proposed hall must be determined : will it be used primarily for sport, or meetings, or dances etc. ? This is the decisive factor in the choice of flooring.

In accordance with the instructions of the preparatory study groups, I shall now discuss halls which are used primarily for sport, but which can also be adapted for other purposes. With this in view, floors of multi-purpose halls should have the following properties :

1. *Subfloor*

1. The subfloor should on the one hand be sufficiently resilient to meet the special demands of every type of exercise ; on the other, it should not be too resilient, because this would impair the bounce of the ball in ball games. Resilience is a property which enables a body to overcome changes of shape caused by an external force, i.e. to recover its original form on removal of the force. For our purposes this return to the original form has to take place within a certain interval, for soft or doughy substances will also return to their original shape (in a container or hard frame) on removal of the load due to the effects of gravity. The resilience required for gymnasiums and sports halls must be "punctual" resilience, i.e. the waves must be short with very little between their highest and lowest points. Moreover, the vibrations must be damped to prevent counter-vibrations which cause health problems and impair athletes' ability to stand and move securely.

The floor of sports halls has to be resilient, because it must, at least partially, absorb the impact produced by running, jumping or falling, thus relieving the human body of part of the shock-absorption. This effect, which can be achieved by the use of suitable flooring, is comparable to the action of a shock-absorber in a car.

Athletes who practise on hard and unresilient floors frequently complain of tiring very quickly. Doctors confirm that lack of resilience in gymnasium and sports hall floors can, in a comparatively short time, lead to arthrosis of the foot joints and put mechanical strain on the periosteum, tendons and muscles, resulting in chronic pains and inflammation—football and basketball players have many a time complained of such pains during indoor training in winter. Doctors therefore recommend specialised training facilities, equipped with floors designed for specific usages, i.e. separate

facilities for gymnastics, games etc. Naturally, when space is limited, such an extreme demand can only be met in cases where several halls are really necessary.

2. High standards of *wear resistance*, or basic stability, durability, load capacity etc., are essential for economy and safety reasons.

As a rule modern games and gymnastics halls are very costly even if everything is done to economize : indeed, only high-quality materials can be used if rapid wear and tear on the floor, due to the necessarily exacting demands made upon it, and its premature renewal are to be prevented.

3. Generally wear resistant gymnasium floors also present a high degree of *tensile strength* and therefore of *safety*.

4. As much account as possible should also be taken in construction of different types of flooring in order to ensure maximum sound absorption. The percussive noises one gets with many flexible types of flooring can reach such a pitch that they are painful to the ear and make prolonged running or ball games impossible. Attempts to eliminate this percussive noise by using insulating materials, such as glass-wool, have frequently ruined the subfloor, because the wood was virtually stifled.

2. *Floor covering*

The floor covering must also meet a number of requirements :

1. It must be *splinter-proof* to prevent injuries.

2. It must be *non-slip* so that athletes can stand and move quite safely. On the other hand, the surface resistance should not be such as to arrest the foot too sharply. Ideally the athlete should come to a standstill with a smooth, slowing-down, sliding movement. An adequate "sliding coefficient" is highly desirable, because when the athlete stops suddenly, his joints and ligaments undergo severe strain which often leads to serious injuries, especially in the knee-joint with pain round the marginal knee-cap, damage to crucial ligaments etc. Another advantage of a good sliding coefficient lies in the fact that it permits the foot to make turning movements which are transmitted to the whole body. If the floor surface prevents such movements, it may lead to injuries to the joints and even—in extreme cases—spinal fractures.

3. The surface must be highly resistant to *wear and tear*. This is of particular importance in multi-purpose halls where special training shoes as well as other types of shoe are worn. Wooden floors have proved to have poor resistance, whereas PVC floorings are particularly resistant.

4. The surface should be dustproof as far as possible because otherwise the air in the hall would not come up to the desired hygienic standards.

With parquet floor-boards with groove-and-tongue joints, hollows appear after a comparatively short time owing to the vibration of the subfloor which will cause the boards to give, especially between the tongues and grooves. In these hollows fine dust will collect and rise up during running or jumping exercises, polluting the air.

5. The surface should be a poor conductor of heat and therefore remain warm underfoot.

6. Of course, floor coverings should be easy to clean and to maintain. These properties are essential in floor coverings for multi-purpose halls. Experience has shown that resistant floors covered with PVC, rubber, linoleum etc. are easy to clean and maintain.

III. *Types of floors used in gymnasiums and sports, games and recreation halls*

A number of types of flooring which may be used in multi-purpose hall floors are described below. The list does not claim to be complete.

1. The *flexible floor* has a wooden subfloor which gives under dynamic pressure. The main criterion is that the floor should be uniformly resistant wherever it is subject to dynamic pressure. As practical experiments have shown, a wooden subfloor cannot produce the necessary short, damped vibrations mentioned in para. II.1.1.

The technical development of the flexible floor started with simple wooden floors in which the floor boards were placed on scantlings. The resilience of these floors varied a good deal from board to board. Later on the subfloor was built on two levels with the joists of the upper level placed in the spaces between the joists of the lower level. These flexible floors yielded to dynamic pressure

at all points, but resistance still varied. In order to obtain uniform resistance, various devices were then employed such as wood, steel or telescopic shock-absorbers and base layers of rubber and plastic. Today there are very few buildings with these floors. A distinction may be drawn here—according to structure—between the single, double and triple types of floor which have a depth ranging from 8 to 25 centimetres.

Flexible floors have poor resistance to damp and need good ventilation, so proper insulation against rising damp is essential. Depending on the nature of the foundation, effective insulation can be obtained with packing paper or plastic sheets of varying thickness (between 0.1 and 1 mm); one of the most effective types of insulation is a 2 centimetre thick coating of bitumastic.

However, too little humidity is just as bad for flexible floors as too much. A humidity of 10 to 12 % in the wood and an average air temperature of about 20 °C are recommended for the preservation of wooden floors. This means an air humidity of 55 to 65 %. Air of this temperature and humidity should be used to ventilate the subfloor or it will begin to decay and rot, as has often occurred, necessitating the renewal of the entire floor. Ventilation is particularly bad in halls with a large surface area of anything over 15 × 26 metres, unless special ventilating equipment is provided, as air vents alone are not sufficient.

A very disagreeable but frequent phenomenon, found particularly with flexible floors, is the occurrence of booming sounds. To get rid of this irritating noise, the spaces between parts of the construction were lined or filled with various damping substances, as mentioned earlier. Although this deadened the noise to a certain degree, air circulation was sometimes impaired to such an extent that the wood quickly showed signs of decay such as dry rot, wood fungus etc. and the subfloor was completely destroyed.

Flexible floors require top-quality timber which is not universally available and, moreover, is very expensive. Because of the obvious disadvantages of flexible floors, efforts were made to find other materials and types of construction to obtain functional floors for gymnasiums. Different possibilities were explored in many countries, the best answer to date being the resilient floor.

2. *Resilient floors*

Like flexible floors, resilient floors come in a variety of forms of greatly varying quality. With resilient floors, too, there are good and bad constructions, and if even the good ones are sometimes criticised, this probably comes from a traditional attachment to the old flexible floors. Opinions also differ according to the users, as is also the case with flexible floors. Moreover, if their appraisal is left to the subjective judgment of a few individuals, the results can only be questionable.

Resilient floors are generally attached to flat surfaces—duly insulated against damp—by means of an adhesive. If the damp insulation is inadequate, the floor may become detached from its base, or the surface covering attached to the resilient floor may lift, form air pockets, or come off altogether.

The materials used for resilient floors include various foam plastics, rubber particles bound with polymers, polyurethanes, and granulated cork rolled into sheets after the addition of suitable binders. Ten years' trial makes a proper evaluation of these products possible today and some of them have stood the test admirably.

Good resilient floors have a constant degree of resilience which can respond to any particular demand without producing irritating or dangerous counter-vibrations. They are break-proof and splinter-proof, exceptionally stable—sometimes high-quality preservatives are added—and highly resistant. They also possess excellent heat and noise insulating properties. In addition, resilient floors are very suitable for ball games because of their excellent bouncing properties. Their non-slip and noise-damping qualities depend on the surface covering. Another important asset—especially in large halls—is the very small depth of their structure which is, at the most, two centimetres.

The great resilience of these floors may lead to excessive wear if they are subjected to great pressure such as heavy apparatus being moved about. In order to avoid any damage to the floor surface, extra attention must be paid to the equipment used for moving apparatus. Thus the castors of trolleys for moving mats and bars should be made of PVC or rubber rather than metal.

The resilience of these floors should absorb the impact produced by running, jumping or falling. Various shock tests have shown that with over-resilient floors, the mechanical force went through the surface covering. This is easily remedied even it, as often happens, equipment is used which causes exceptional shocks, such as jumps off high apparatus and other impacts of the same sort.

3. *Asphalt floors*

Asphalt floors have also been used in gymnasiums and sports halls as well as in multi-purpose halls. Some are seal-coated, but more recently they have been covered with materials containing PVC, sometimes with additional layers of PVC foam. Asphalt floors have either no coefficient of resilience at all or—when a surface covering is used—too slight a one, so that they are not approved of by doctors and orthopaedists, because they are dangerous in the case of falls and cause athletes to tire relatively quickly. They are inexpensive and easy to maintain ; however, they are not very suitable for multi-purpose halls.

IV. *Surface coverings*

At the moment the following materials are used as surface coverings for flexible floors :

1. wood in the form of adhesive parquetry and long and short strips ;
2. PVC coverings in rolls and tiles ;
3. linoleum in rolls and tiles ;
4. rubber in rolls and tiles ;
5. synthetic carpeting in rolls and tiles.

PVC seems to show the highest degree of wear resistance and presents few maintenance problems. Synthetic carpeting, which has received more attention recently, seems to be only suited to certain types of sport like tennis. As far as ordinary gymnastics are concerned, it has occasionally been found with barefoot falls or exercises that a PVC covering caused unpleasant sores due to friction.

Rubber materials are useful for certain types of sport, although their "braking power" is considerable ; a further disadvantage is their tendency to act as condensation surfaces when the weather is damp, which makes them slippery.

When PVC, linoleum, rubber or carpeting are used on flexible floors, panels which distribute the pressure evenly have to be applied to the subfloor.

With resilient floors, surface coverings may even be dispensed with under certain circumstances ; in such cases, the floor need only be sealed or, if necessary or desirable, given a coat of paint. Surface coverings on resilient floors are usually made of PVC. Tiles are preferable to rolls for reasons of dimensional stability. In some cases a hardening of the top surface has been observed after the application of PVC to resilient floors. When suitable adhesives and glass-fibre fabrics are used, resilience is also very much affected. Very good results have been achieved with resilient floors covered with pure PVC.

It only remains to be pointed out that any surface covering requires special care if it is to come up to expectation. Inadequate care and cleaning can completely ruin surfaces which were originally perfectly suitable for games and sports.

V. *Markings*

In halls used for games, the play areas of the games most frequently played should be permanently marked out. For games which are played only occasionally, markers should be used. Permanent markings should be wear-resistant and of standard colour and size. Wood, linoleum or carpeting can be marked either with paint or with adhesive tape of the required colour and width. The same applies to PVC coverings which, however, may also be marked by means of welding, which is certainly the most durable method. These markings will last as long as the surface covering itself.

VI. *Conclusion*

After what has been said so far, it is only natural to ask : which type of floor and which surface covering is the best ? Of course, there is no such thing today as a low-cost multi-purpose floor which combines variable resilience, flexibility, non-slip and hard-wearing qualities.

If a flexible floor is to be chosen for a multi-purpose hall, its coefficient of resilience would have to meet the requirements of every type of sport and gymnastics practised in this particular hall. Of course, there has to be a certain degree of compromise over the respective requirements.

Certainly the flexible floor should ideally possess all the above-mentioned qualities, that is, it should not be a source of additional noise and should only be used with a damp-proofed subfloor ; adequate ventilation should be ensured, especially if the surface covering is made of an airtight material such as PVC. However it has been found that the two basic criteria for installing a flexible wooden floor—namely damp-proofing and adequate ventilation—are often neglected to such an extent that the subfloor starts to rot and decay after a comparatively short time. The value of equipping large gymnasiums and sports halls with flexible floors is therefore open to question.

Resilient floors seem better suited to large multi-purpose halls, i.e. halls of the type with which we are concerned here. However, that does not mean that resilient floors are the only possibility.

Asphalt floors, we have already seen, are not to be recommended, since they fall down on most of the basics.

To my mind, the ideal solution would be to install the type of floor best suited to each particular sport or event. This is done in the *Stadthalle* in Vienna where flexible parquet flooring can be assembled to provide a vast uniform surface for ball games, dances, gatherings etc. This surface can be overlaid with special coverings to suit any type of sport, such as tennis, for example. Polyurethane coverings are used for different types of athletics ; an ice rink covers the same surface for ice-hockey games or performances of ice-skating reviews. This flexibility and variability is certainly ideal, but it is very expensive and out of the question for our purposes, since we are, after all, concerned with low-cost gymnasiums and sports halls. We therefore have to look elsewhere.

As things are at present two types of flooring seem to be the best and I list them in my own personal order of preference :

1. Resilient floors which seem very well suited to gymnasiums and sports halls. They present few problems and, if their performance thus far is maintained, will undoubtedly be regarded as the ideal solution for multi-purpose sports halls and gymnasiums, especially when large surfaces are involved.

2. Flexible floors with maximum damp-proofing and ventilation, limited depth, sound-absorbent and overlaid with an unbroken, hard-wearing surface covering. If the latter is not suited to all purposes, it can be covered with presswood fibre panels if the surface is made of PVC, rubber etc.—or with PVC, rubber etc. if it consists of parquet flooring.

3. GUIDELINES FOR A GOOD LIGHTING SYSTEM

by M. G. Hietbrink,
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1. *Starting-point*

Generally speaking, the basic function of the lighting system in a sports hall is to create the best possible *visual* conditions, efficient as well as pleasant, for the players and spectators. With lighting, good visibility is as important as comfort, which explains the need for weighing physical and psychological considerations.

However, the lighting engineer cannot work in "splendid isolation". He cannot unconditionally accept the design of the building as an immutable *fait accompli* to which he is merely to add a suitable lighting system without comment. He should, on the contrary, be consulted at the planning stage. There is a close relation, for example, between the choice of materials (colour and texture) and the lighting system which shows up the surroundings and their shapes and colours. Other technical factors (such as heating, ventilation and lighting) influence one another, because lamps give off heat ; this aspect can no longer be overlooked as lighting intensity is tending to increase.

The above-mentioned factors form an interdependent system making up the overall human environment. The lighting designer has to collaborate with many other experts. Sometimes, by a miracle, a motley group of experts ends up as an efficient team : but many of us—at least in the Netherlands—seem more ready to criticise one another's faults and imperfections rather than use each other's abilities to good advantage.

Thus it is as important to solve communication problems as to acquire technical know-how. It may be worth mentioning this simple fact before moving on to the purely technical aspects of lighting a sports hall, since means of remedying communication break-downs are few and often extremely expensive.

2. *How should the basic requirements be defined and fulfilled ?*

In these pages, we shall attempt to outline the necessary requirements for a sports hall's lighting system to function satisfactorily and facilitate the playing of sport at low cost. We shall confine ourselves to multi-purpose halls designed primarily for a variety of sports activities but able, if local circumstances so require, to serve for additional socio-cultural activities.

This raises two further points :

1. What do we mean by "functioning satisfactorily" ?
2. What do we mean by "low cost" ?

3. *"Functioning satisfactorily" : the requirements for comfortable visibility*

We can safely assume that the efficiency of a lighting system depends on its quality ; and the quality of lighting is in turn influenced by three factors :

1. Illumination (lm/m^2) ;
2. Colour temperature and rendering ;
3. Spatial distribution of light.

Any good lighting scheme is based on a recognition of the importance of these basic factors for the project in hand ; the choice of lighting sources and fittings and their arrangement should be founded on this analysis.

The illumination of the working plane (lux unit = lm/m^2) determines the visibility of the object under observation. Generally speaking, the stronger the illumination, the better the visual performance. In fact the human eye sees very well in daylight conditions, where illumination is relatively strong (2,000 lux or over).

However these high levels of illumination are only possible if numerous brilliant light sources are frequently used. It is therefore necessary to avoid dazzling players and spectators either physically or psychologically. Both these types of dazzle can be caused by artificial lighting sources as well as by natural daylight.

The following characteristics of lighting sources are important :

— number,

— zone,

— luminosity (brilliance),

— position in the field of vision.

Nowadays the view is taken that the main advantage of windows is that they provide good visual contact between the inside and the outside world. In sports halls, windows can easily produce glare ; moreover, as the facilities are mainly used during the evening, the necessity for windows should be carefully weighed. In many countries there is a strong tendency to exclude daylight altogether or only to allow it to enter through apertures in the roof, combining it with electric lighting. Diffusers or light deflectors can then be used to exclude direct sunlight and daylight when they cause glare.

In any event, good lighting arrangements are essential because artificial lighting will often have to replace daylight entirely. With artificial lighting sources, technical devices to prevent dazzle by concealing and shading the light from lamps with deflectors and/or diffusers will nearly always be needed.

Illumination should be fairly evenly distributed but at the same time produce sufficient shadow and contrast to make it possible to distinguish shapes and give a good spatial perception of objects, their distance and their speed. This is particularly difficult to achieve, but as a sound basic approach, the following arrangement is to be recommended :

(*a*) a diffused general lighting system based on fluorescent lamps ;

(*b*) directed beam lighting from additional sources.

At the moment, tungsten filament lamps, such as reflector lamps for example, are mainly used, but in the near future it will be possible to use certain types of discharge lamps with a much higher output thanks to their colour rendering qualities.

Lastly, colour temperature and rendering are important because they have a considerable effect on the colour climate and the comfort of the lighting. For most sports halls white light (4,000 K) is preferable with natural colour rendering (an index of 80 at least).

4. *Some economic considerations in connection with "low cost" lighting*

After considering the qualities lighting should possess, we are left with the question of "low cost". With lighting, as with building, heating etc., quality has its price. Once the lamps and apparatus have been chosen, *illumination*, up to a certain point, is in proportion to the installed electric power per m^2. The stronger the illumination, the greater the need for effective measures to prevent dazzle. However, such measures reduce luminosity, so that a greater number of powerful lamps and more W/m^2 are needed.

Lamps with good colour rendering have a lower luminosity than lamps with average or poor colour rendering capacity. *Therefore better quality means higher capital and running costs.*

However, there is a great difference between the lowest acceptable quality and the best quality imaginable. As far as the *lowest acceptable quality* goes, every lighting engineer will obviously have his own ideas. In the Netherlands, the committee on sports lighting came to the conclusion that at least 500 lux were to be advocated in a system equipped with good diffusers. However it is not possible to supply a practical answer which would be applicable to all countries and conditions in Europe. In every scheme, the quality of the lighting system should be in keeping with the standard of the building as a whole. Once the quality has been precisely defined (that is to say, priced), it is possible to design an economical lighting system which is in keeping with the standard of the overall project.

The upper limit of the above-mentioned difference is the best system imaginable. What that entails depends largely on the lumino-technical and architectural possibilities and limitations.

We have now established the difference between the *"most advanced"* and the *"just about acceptable"*. This fact is of no great importance. The real problem is to find the best solution—what the American designer R. Loewy once called the *"most advanced that is still acceptable"*.

If we calculate the effect of the various factors (like illumination, dazzle prevention and colour) on capital cost, we find a ratio of about 1 to 11 between the poorest and the best quality. For example, the light derived from fluorescent lamps with good colour rendering properties is 30 % lower than that produced by lamps with a poor colour rendering capacity. The cost of lighting apparatus with a good diffuser is 50 % higher overall than the cost of a plain fluorescent lighting unit. The efficiency of a general lighting system with no dazzle-prevention devices is about 15 % lower than that of a system equipped with good diffusers.

Table A, based on these figures and starting with very poor quality lighting (250 lux, no concealment and poor colour rendering), gives a general estimate of the cost of lamps and apparatus which would provide a more or less ideal system : 1,000 lux, with good diffusers and good colour rendering. I would point out that the only reason this very poor quality lighting is mentioned here is that it may still occasionally be found in use ; in fact it is a system which is disappearing fairly rapidly from the utilitarian lighting scene. It will be seen that if x is the cost of the most elementary system, the cost of the best system is about 10.8 x.

Table A

Illumination	no dazzle prevention		good dazzle prevention	
	average colour	good colour	average colour	good colour
250 lux	1) x	5) 1.5 x	9) 1.8 x	13) 2.7 x
500 lux	2) 2 x	6) 3 x	10) 3.6 x	14) 5.4 x
750 lux	3) 3 x	7) 4.5 x	11) 5.4 x	15) 8.1 x
1,000 lux	4) 4 x	8) 6 x	12) 7.2 x	16) 10.8 x

The left-hand column of possible alternatives reading down the page (1-4) is not to be recommended because of dazzle and/or poor illumination.

The top row alternatives reading across the page (1, 5, 9 and 13) are not to be recommended because of the low lighting intensity. The more expensive systems such as 12, 15 and 16 cannot be entertained in the context of low-cost facilities. Even leaving these out, we are still left with a range of about six alternatives with a price ratio of 1 : 2.

Low-cost sports halls in the Netherlands cost about 500,000 florins ; expensive types about 5 million, or about ten times as much. Comparing these figures, it may be said that for every standard of project it is possible to choose a lighting system of a standard suited to the requirements.

In my opinion, it is both possible and necessary to plan specific projects with an eye to this appropriate standard of lighting if we are really to achieve the Council of Europe's aim of "*Sport for All*—recreational sport for the greatest number". The basic problem is not a lack of "hardware" or "software" but largely a need for real co-ordination in planning.

4. ENVIRONMENTAL CONDITIONS IN SPORTS HALLS

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1. *Introduction*

In general it may be stated that dwellings and buildings are equipped with the necessary means for controlling the indoor climate.

For dwellings, there is no longer any doubt regarding the level of the required indoor temperature and similarly this problem no longer exists either for offices or for a number of other spaces where work is performed. In addition, it is already fairly well known how the indoor climate conditions must be adapted to the severity of the work performed for a number of industrial activities.

In the past, the required knowledge regarding this climatic aspect used to be gained from practical experience, but gradually one has been successful in establishing a more theoretical basis. The heat regulating mechanism of the human body is coming to be better known and consequently one is becoming more acquainted with the influence of the environmental conditions which must allow the possibility of removing the heat generated by the work that is performed.

Undoubtedly this knowledge will be useful when designing and in the utilisation of sports halls. It will however be necessary to consider that the performance of a sport within a hall involves some specific problems which will affect the indoor climate inside the hall.

From a technical point of view there is a noticeable difference between practising a sport and performing the daily task during a period of eight consecutive hours in a factory, in an office or at home. The exercise is undertaken entirely voluntarily and this applies both to each individual activity as well as for the entire game or event. Although most activities which take place during a sporting event will involve a fairly intense form of exercise and produce a corresponding quantity of heat, this process only occurs during relatively short intervals of time and generally will be a periodic type of activity. The bodily performance is generally accompanied by a positive mental effort.

The requirements as regards the environmental conditions inside a sports hall are not solely dictated by those actually engaged in the sport but can also concern a smaller or larger number of spectators. Contrary to those actually partaking in the sport, the spectators generally are at rest and consequently they will appreciate a higher indoor temperature than the players. When designing environmental conditions inside sports halls, it is therefore desirable to be acquainted with the requisites for the particular sporting event.

Some remarks will follow regarding the human heat regulation mechanism and environmental factors affecting this aspect, after which the results will be given of an enquiry which was held in a number of sports halls.

After their game, some 500 players were interviewed regarding their findings and these data were correlated to the air temperatures that had been measured during the match. The results were compared with more frequently used data relating human heat generation, indoor climate and evaluation of the latter.

For the matches under investigation, i.e. volleyball and handball in league and first class grades, it was possible to conclude that use may be made of the normal comfort chart for deriving desired environmental conditions. The chart shows the relationship between the indoor climate that is desired and the intensity of the work performed. From the enquiry it was learnt that a majority of the people who were approached regarding their view, i.e. 80-85 %, considered the climatic conditions to be in "thermal equilibrium".

2. *The heat generated by the human body*

The human body generates heat ; at rest, the heat quantity amounts to about 70-100 kcal/h. When performing work, this quantity increases and can attain values of about 300-400 kcal/h and sometimes even higher.

For particular types of sport, the heat quantity generated can be very much higher still. Table 1 for instance shows that a maximum of 660-720 kcal/h may be generated during periods of intensive training or when boxing or wrestling.

As the quantity of generated heat increases, the human organism does everything to increase the rate of heat emittance, since proper functioning of our body can only be achieved at a consistent internal temperature of 37 °C. The blood circulation of the tissues immediately below the skin will then increase, and when even then the heat emitted falls short of its goal, sweat will begin to appear on the skin.

The climatic conditions around a human being will finally be decisive regarding the quantity of heat that can be emitted from the body. Three particular means of body heat removal are available (see fig. 1). Provided the air temperature is not too high, heat passes from the human body to the environmental air, and the transfer process is known as convection. Convection can be appreciably stimulated when air flows along the body at a certain velocity. The allowable limit for this velocity is laid down by the occurrence of a well-known and generally feared symptom, namely draught.

The temperature of the walls enclosing the space in which man resides will generally be lower than that at the surface of the human body. Between these two surfaces, heat will be exchanged by radiation and on account of this exchange, body heat will be emitted. The quantity of radiant heat involved not only depends on the temperatures but also on the nature of the surfaces in question. An aluminium lining for instance will completely suppress all radiation irrespective of the heat that might be transmitted to the aluminium cover from a layer below it. Finally it can be said that sweat will be converted to vapour in the environmental air. This evaporation requires a terrific amount of heat, namely 600 kcal per litre of moisture which is evaporated from the human body.

On account of the above-mentioned alternative conditions that may exist, man may well find himself subjected to situations that differ appreciably. When the heat emitted is in excess of the body heat that is generated, the sensation of cold will be experienced. When, on the other hand, the emitted quantity of body heat is equal to the generated quantity, the climatic conditions are considered to be comfortable. Finally, when the heat emitted is less than the heat generated, one first becomes hot, then too hot and finally the allowable limit will be reached. The body temperature in this case increases despite all efforts of the human organism to augment the rate of heat removal.

An idea may be obtained regarding the heat load severity from some physiological criteria, namely pulse rate, the body temperature and the amount of sweat produced. For the performance of an uninterrupted type of duty, Groot Wesseldijk has specified the following allowable limits : pulse rate 120 ; body temperature 38.3 °C ; sweat evaporation 0.75 l/h. In his opinion, increasing the human stress beyond these figures is not medically justified for young and healthy workmen who are exposed and fully acclimatised to heat.

3. *Evaluation of the indoor climate with reference to human heat generation*

Many investigations have been made regarding the performance of continuous work carried out under proper performance control and under specific environmental conditions. Two notions in particular are of vital interest in this connection, namely "comfortable" and "allowable".

When performing a light task for a long time, it is necessary that the job is done under circumstances which will ensure thermal balance for the human body. The conditions in this case can be defined as comfortable.

For a heavy industrial job, it is generally not possible to consider the comfort aspect. On the one hand high quantities of human heat are generated and on the other the environmental

conditions are dependent on the particular industrial process that is being performed and which may release large quantities of industrial heat.

In order to experience the sensation of comfort, it is not only necessary that the quantities of heat generated and heat removed be equal. In addition, the heat removal from all parts of the human body cannot be too irregular, and furthermore, certain relations between the three methods of heat transfer may not be exceeded.

The environmental conditions can most suitably be defined by the assignment of values to the air temperature, the radiant temperature, the humidity of the air and the air velocity. A record of these data should be available for a number of points in the space. This is undoubtedly the best method. For purposes of simplification, research has always been interested in a method for combining these different aspects into one single characteristic value and attempts to this end have resulted in the introduction of the "effective temperature".

In many publications, reports and directives, the environmental condition is expressed by this single factor. Combinations of climatic factors which result in an identical sensation of heat or cold are considered to be thermally equivalent and will have an identical effective temperature : t_{eff}. For any specific climatic condition, t_{eff} corresponds to the temperature of saturated air in a space which will result in an identical sensation of heat or cold.

Since this report is scheduled to be brief, we shall also assign values of this effective temperature to our definitions of comfortable and allowable. The vertical axis of figure 2 shows the quantity of human heat being generated, although in reality it indicates the brute energy consumption. The latter amount includes the work that has been done in addition to the heat generated. The work is however performed at a very poor efficiency, which does not even attain the value of 20 %. Of the energy that is spent about 80 % therefore is converted to heat.

The horizontal axis of figure 2 shows the effective temperature.

The diagram shows (*a*) the curve representing thermally neutral conditions and (*b*) a zone with the allowable limits. Between (*a*) and (*b*) there is an appreciable transition zone in which there is no question of thermal balance, although from a medical point of view, the situation is entirely allowable. People who when classified fall into this transition zone, will only notice that they feel warm or perhaps too warm for their liking.

When critically reviewing the different climatic situations, one must recall that an opinion such as "comfortable" is always a strictly personal matter. This is the reason why standards can only be fixed when a large number of test persons have been interviewed. In addition it will be clear that it is not possible to create a climatic situation which will be considered comfortable by everyone (100 %) involved.

When classifying the answers to be submitted into the five well-known categories, i.e. too hot, comfortably warm, comfortable, comfortably cool and too cool, and when combining the middle three categories, the maximum percentage of answers that fall into this total can amount to 90 %.

4. *Environmental conditions in sports halls*

For any particular branch of sport, the desired (effective) temperature in the hall should be known. It is open to question whether the preferred temperature must be based on achieving thermal balance for those actually engaged in the sport or whether it is possible to make an arbitrary choice of this temperature somewhere between the comfortable status or the allowable limit.

In this connection it is recalled that both these criteria are laid down for the continuous type of work, and a sporting event hardly falls into this category ; in addition it can also be necessary to consider the spectators. We always have been and still are of the opinion that one should only consider the case of those partaking in the activity. This is recommended, since it is generally recognised that performance is favourably affected when the heat surplus occurring in the body during a human activity is a minimum.

From a technical point of view it would for instance be strange to hold a boxing match at which, for the sake of the spectators on the spot or at their television sets, the contestants would be subjected to the exorbitant heat of the required illumination.

This might well hamper the removal of the extreme heat quantity that is generated during boxing and thus appreciably lower the efficiency of the human performance.

From Table 1 may be deduced that the energy spent during a game of handball amounts to about 370 kcal/h and that according to figure 2 the t_{eff} for thermal balance in this instance will occur at 7 °C. For volleyball these figures are respectively 230 kcal/h and 15 °C. The allowable limits for these two games occur respectively at the effective temperatures of 26-30 °C and 28-32 °C.

Following instructions received from the Dutch Sports Federation (NSF), preparatory data have been compiled for an enquiry concerning 500 players in 25 sports halls. The sports chosen were restricted to indoor volleyball and handball, both for men only and for league or first class matches.

After the match, the players were asked to express their opinion regarding a number of climatic aspects which included the temperature level. They were requested to mark on their enquiry form their choice between the five alternative environmental evaluations which have been specified under item 3 above. During the matches, the air temperatures in the halls were recorded. In the various halls the temperature varied between 14 to 22 °C and this happened to comprise a suitable range of temperatures for such a study. For each separate match, the temperature in the hall remained approximately constant throughout the game. For volleyball alone, 21 matches were included in the investigation. In adding the middle three climatic evaluations so as to consider them as one group for comparison against the specifications of "much too cold" or "much too hot", it becomes possible to compile frequency curves of the scores expressed in percentages and plotted against temperature.

The results of the survey are shown in figure 3. As the temperature in the hall becomes lower, the score obtained for "too cold" increases and 70 % considered this to be the case for 14-15 °C. As the temperature is raised, the score obtained for "too hot" increases and more than 70 % found the temperature too warm between 21-22 °C. A maximum of 80 % assignable to "good" occurred at the temperature of 17-18 °C. The number of persons who considered the climatic conditions to be good at either 14-15 °C or 21-22 °C was clearly small and lower than 30 % of the total votes.

The measurements concerning the humidity of the air in this investigation were not successful. According to the best estimates made, it must have varied between 28-40 % relative humidity. From this approximate figure and under an air temperature of 17-18 °C, the most desirable value for the effective temperature would be 15-16 °C.

When we compare these values with those shown on the diagram in figure 2, it is apparent that for energy spent at the rate of 230 kcal/h, they are close to the "thermally neutral" curve of 15 °C. It therefore appears justifiable to conclude that the values derived from the normal comfort charts also apply for volleyball matches and that the conditions denoted on this chart are the most popular for partakers in this game.

The results obtained from handball matches had to be deduced from a much lower number, namely only 8 matches. In this case, it will only be possible to deduce a certain trend.

For every match the number of votes specified for "too cold" was practically identical and amounted to 6 % or less of the total votes. Practically speaking, therefore, the entire range of the temperatures existing in sports halls must either be considered to be "good" or "too hot". The number of votes denoting "too hot" increases from 15 % of the votes at temperatures from 14-15 °C to 90 % at temperatures from 21-22 °C. Even at the lowest hall temperatures that were recorded, an appreciable percentage of the players still found it "too hot".

The score obtained for "good", diminishes from 80 % at 14-15 °C to 5 % at 21-22 °C. It must be added that a hall temperature of 19-20 °C did not occur during the investigation and the results obtained for a single match at a hall temperature of 18-19 °C were exceptional, in our opinion.

The results are shown in figure 4. Further thought on this figure indicates that the maximum score for "good" was obtained between 14-15 °C, though one cannot be certain that this is the most popular temperature. The trend of the score for "good" at still lower temperatures is not available, while the score obtained for "too hot" at 14-15 °C is clearly higher than the percentage considering this "too cold".

At the value estimated for the relative humidity and at an air temperature of 14-15 °C, the effective temperature will approximately amount to 14 °C. From the diagram of figure 2, this temperature is clearly within the "warm" zone and somewhat outside the curve representing thermally neutral conditions at 7 °C.

It is clear that the investigation regarding hall temperatures should have been carried further beyond the lower limit of 14 °C in order to be able to find out which air temperature is desired

by the players. It appears that hall temperatures of 14-15 °C or a t_{eff} of 14 °C were definitely the most popular of the temperatures recorded during the test. The results given show the method of approach to be followed when a decision is desired regarding the temperature in sports halls by the players.

We believe the conclusion is warranted that for league and first class matches of volleyball and handball, the desired temperature approaches that prescribed by the curve representing the thermal balance of the players. These curves are definitely lower than the temperatures customarily maintained in sports halls.

A suitable choice regarding the temperature desired in the hall can be based on the energy consumed by those actually engaged in the sport. In the majority of sports halls several types of sport may be undertaken and it should be noted that the rate of energy consumption can vary quite appreciably for each particular type of sport and also between the various degrees of one type of sport.

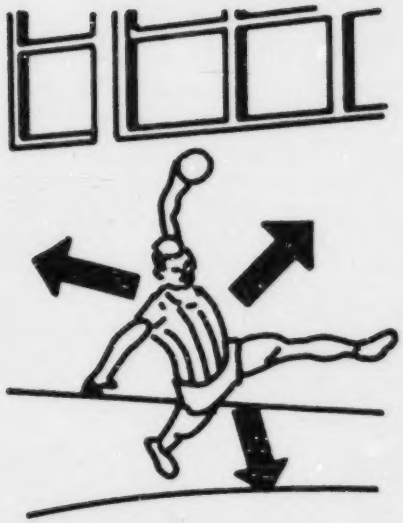
It is clear that the installations used for sports halls should be able to comply with a variety of demands. This implies that a control mechanism must be fitted and that during use of the hall this control shall be put to use in order to adapt the indoor climate of the hall to the particular type of sport.

When it is desired to adapt the environmental conditions to the wishes of spectators, the temperature will generally be too high for the players, who will feel warm.

Table 1

ENERGY CONSUMPTION

Volleyball		230 kcal/h	Basketball		525 kcal/h
Indoor handball		370 kcal/h	Table-tennis		650 kcal/h
Indoor korfball		420 kcal/h	Judo		650 kcal/h
Indoor hockey		420 kcal/h	Sport-training		660 kcal/h
Badminton		420 kcal/h	Outdoor sports		660 kcal/h
Tennis	doubles	455 kcal/h	Boxing		710 kcal/h
	singles	510 kcal/h	Wrestling		715 kcal/h



RADIATION

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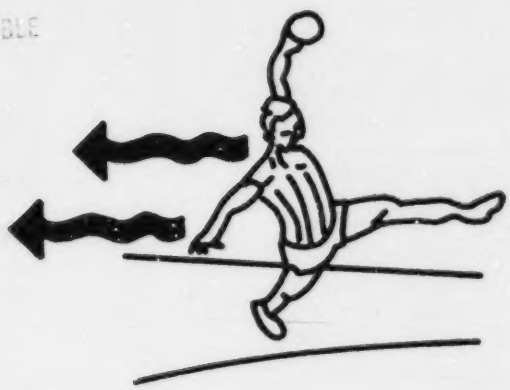

CONVECTION

EVAPORATION

Fig. 1

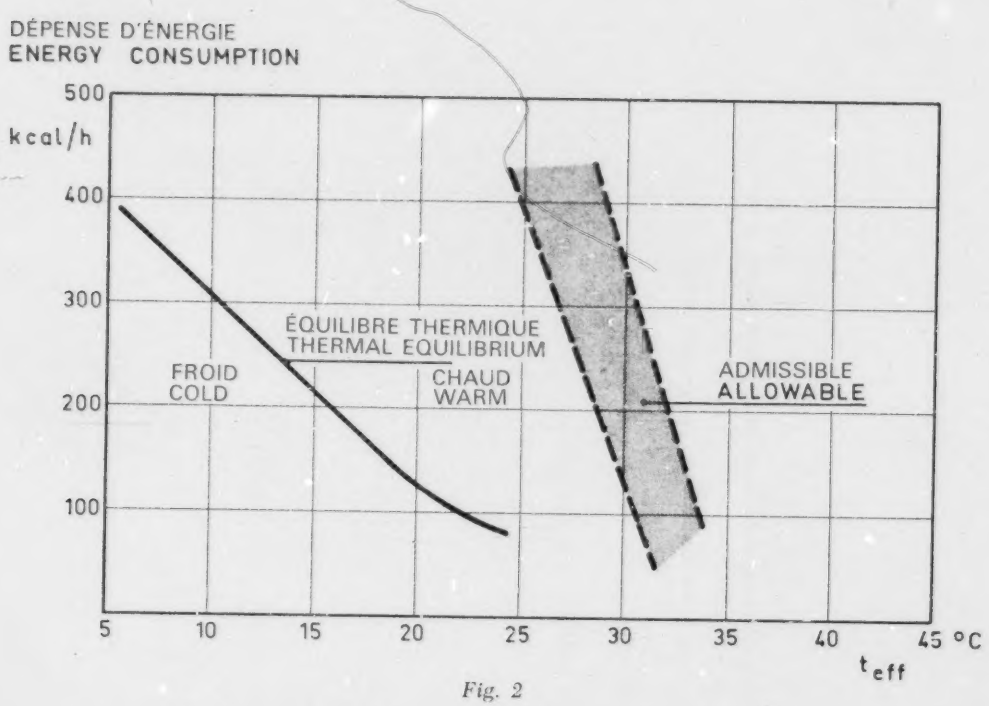

Fig. 2

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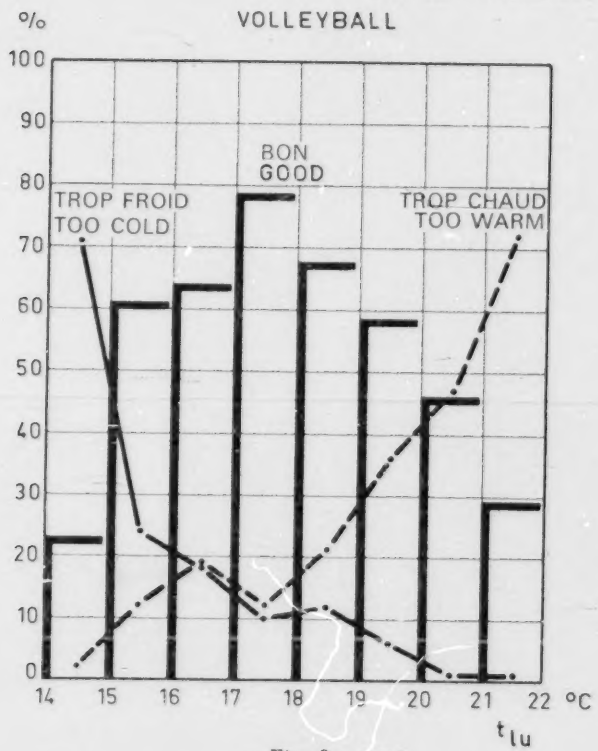

Fig. 3

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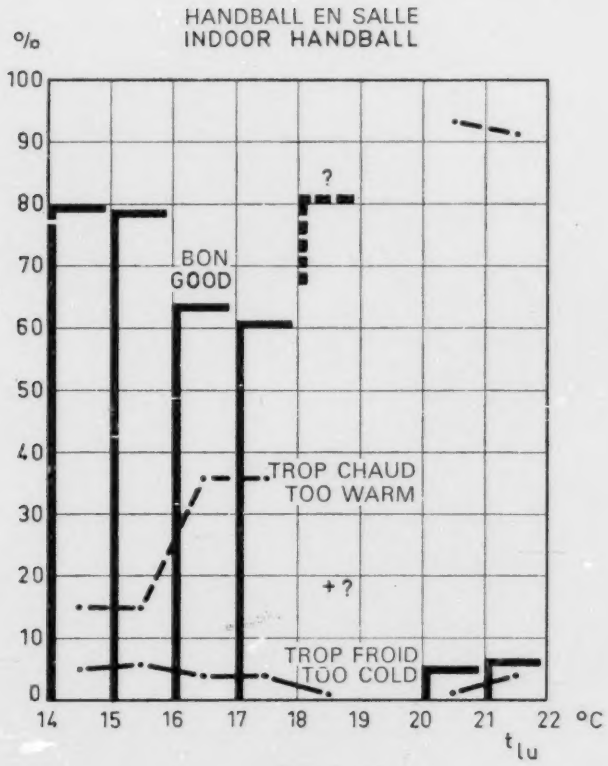


Fig. 4

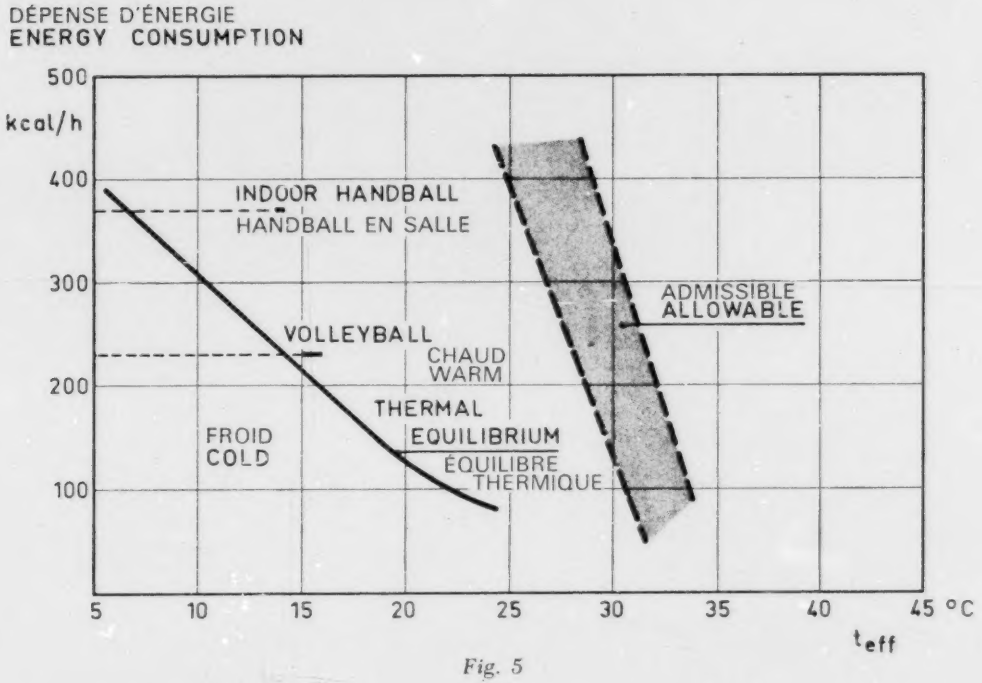


Fig. 5

5. ACOUSTICS IN SPORT HALLS

by H. Graner

Games and sports are today associated with the idea of outdoor exercise, away from the noise and confined space of houses, because it is open-air conditions that give these activities their meaning.

Indoor sports facilities arose from the desire to satisfy this basic need whatever the weather or time of day. It is therefore not surprising that efforts were made when building sports halls to reproduce open-air conditions. The desire for plenty of fresh air and light led to the construction of spacious, well-lit buildings.

Unfortunately, conditions conducive to good lighting and ventilation are less favourable as regards acoustics. Whereas out-of-doors, the ground absorbs the sound of running feet and acoustic signals are lost in the air, in sports halls, the reverberation of the wooden floor and the noise re-echoing from the walls and ceiling, often consisting of over 50 % of glass, produce acoustic conditions which have nothing whatever in common with open-air conditions. This is often a hazard of indoor sports.

It is undoubtedly impossible to reproduce outdoor acoustics in a hall ; it is therefore more realistic to consider what acoustic demands can be made of a hall without limiting the scope for sport too much.

But before tackling this problem we must consider the nature of such limiting factors.

First of all, there is the noise from running feet or the handling of apparatus, which is amplified and reflected back by the wall surfaces increasing the noise level.

A second factor is that verbal communication is an integral part of sport, not only communication with a partner close by, but also, in some cases, from opposite ends of the hall.

As long as halls are intended solely for sports practice, the acoustic problem is relatively easy to solve. However, when they are used for competitive sport, the problem becomes more complicated as it then becomes necessary to provide acoustics which are equally satisfactory for spectators and the mass media (television, radio and film). It can safely be assumed that spectators at a sports event will make a lot of noise. However, with reverberations from 7 to 10 seconds long, as is often the case in sports halls, the noise virtually never dies down at all. This means that the players are subjected to additional mental and physical strain from continuous noise.

The problem is further complicated by the fact that the spectators have to be informed of the scores and results which radio and TV commentators have to relay to a far wider audience. However, even with proper electro-acoustic equipment, words are no longer sufficiently intelligible when reverberations last from 7 to 10 seconds because the syllables overlap and become indistinguishable.

If this defect is to be overcome, the following aspects should be taken into account in planning sports halls :

1. as low a sound level as possible ;

2. a resonating time of not more than 1.6 secs. ;

3. conditions 1 and 2 to apply regardless of the presence of spectators.

The sound level is determined by the noise produced by running, jumping, clapping or shouting, and by the resonance of the hall. The sound reflections from wall surfaces can increase the sound level by up to 10 decibels, thereby doubling the noise. Obviously, therefore, the first thing to consider when endeavouring to reduce noise, is the floor. The next is all the apparatus and equipment. Manufacturers of the latter should be made to comply with compulsory regulations regarding maximum noise limits.

The hall itself should be designed with a smaller cubic capacity and walls made of sound-absorbent materials.

Of course a whole series of other essential factors, such as ventilation, light, solidity etc. have to be considered when deciding on the volume and materials of the walls, which means inevitable compromises as regards both the cubic capacity and the use of highly resonant materials for the floor, windows and parts of the walls. This automatically limits the possibility of eliminating detrimental sound reflection.

To give a standard example, let us take a hall in which all the surfaces are highly resonant. We can expect reverberations of 7-10 secs. length, with an increase in the sound level of 8 to 10 decibels, or double the sound. However, this can be considerably reduced by covering the ceiling and the two transverse walls of the usual type of rectangular hall with highly sound-absorbent materials (at least 0.8). Experience and numerous tests carried out in completed halls have shown that, for this additional expense, the reverberation length falls from 8-10 secs. to between 1.5 and 1.6 secs., which means a drop in the sound level of about 8 decibels.

Intelligibility in a hall depends essentially on the sound level and length of reverberations. There should be a difference of not less than 8 decibels between the general sound level and the sound level of speech, and the resonance should be such that there is a difference of intensity of not less than 6 decibels between individual syllables. Thus here we see that the size of the hall plays no part in the acoustic requirements, but the larger the hall, the more it will cost to satisfy them.

Satisfactory intelligibility is achieved with reverberations of 1.6 secs. ; ideally, they should be 0.6 secs. We may say that sports halls with reverberations of 1.6 secs. or less represent the maximum possible reduction in sound level consistent with moderate cost and good intelligibility. Covering the transverse walls, possibly only from a height of 2 metres upwards, has the added advantage of suppressing the multiple echoes which occur between parallel sound-reflecting surfaces over 16 m apart, often causing considerable disturbance. For instance, due to a multiple echo, a hand clap to start off a gymnastic exercise may be heard up to ten times with the same intensity as the original clap, which is extremely irritating.

Halls designed on these acoustic lines can also be used satisfactorily for other purposes (e.g. meetings, musical entertainments) provided that the acoustic standards demanded of the music are not too high.

Sport halls designed to take spectators, with tiered seating, for example, have a greater volume and correspondingly longer reverberations. The spectators generally counteract this effect because they themselves have a high sound-absorbent capacity. Things only become critical when events take place with few or no spectators at all. This can be counteracted by making the vertical surfaces of the seating sound-absorbent, using for example perforated concrete backed with sound-deadening material. If this is done, the resonating conditions will be independent of the number of people in the hall.

Summing up, we may say that, even when a sports hall is properly designed, it is impossible to reproduce open-air acoustics but that it is possible to create conditions in which sports activities can take place without excessive noise and disturbance.

C. ECONOMIC ASPECTS

1. **Economics of building methods,** by R. Taillibert
2. **Management,** by J.A. Jeffery

1. ECONOMICAL BUILDING METHODS

by R. Taillibert, Architecte en chef des bâtiments civils et palais nationaux, Paris

I. *Architecture of sports buildings*

At a time when architects throughout the world are experimenting with forms that are spatial, rational and economical, sports buildings, by their human function, afford immense creative possibilities.

Sports architecture implies large-scale spatial arrangement, conditioned by playing surfaces and spectator accommodation. Rational planning of sports facilities and structural design constitute a single entity.

Siting plays a very important part in the creation of a sports complex : its geographical location in a city is crucial.

Good visibility and complete freedom for the spectators are the factors which should determine the choice of a particular site.

Economy in the construction of sports buildings has two distinct aspects :

— economy of construction,

— the effect of such economy on management.

The changes in our society create a need for new multi-purpose buildings, although in the sports sector their dual purpose stems from planned utilisation of the facilities.

As sport has priority, sports buildings are one of the needs of our society which make the most demands on the structures, though these may not be intended solely for this type of building.

II. *Definition of types of structure for sports halls*

These can be divided into two categories :

1. heavy structures,

2. light, low-cost structures.

A. *Heavy structures*

Such buildings are usually built by traditional methods, as follows :

(a) *Vault-shaped halls*, made either of concrete arches or of laminates, with metal roofing, insulation and weather-proofing.

(b) *Three-directional structures* (using metal tubing). These can be standardised, prefabricated and used in widely different ways : geodetic domes, supported floor, cylindrical vaults. They are not yet widely used. They result in great savings in metal and can be manufactured on a industrial scale. The lighting is located in the structural framework and is thus part of the overall architecture.

(a) *Vault-shaped halls*, made either of concrete arches or of laminates, with metal roofing, effects. It is made of prestressed concrete and requires specific studies. Its cost is competitive with that of metal. These structures are built by traditional methods.

(d) *Mixed structures*, beams and columns with load-bearing walls are still among the most commonly used. The static form of the parallelepiped is found in all our countries. They are costly for long spans and of no great architectural interest.

B. *Light, low-cost structures*

(a) *Mixed structures, using the "Jáwerth" process* : pre-stressed girders using tensioned cables, supporting light, insulating roofings, affording great ease of assembly, entirely unencumbered space (numerous applications in factories and sports halls).

(b) *Network of cables with connecting membrane* (metal or wood) very little known, but their development should be watched. (German pavilion, Montreal—Sports amenities, Munich.)

(c) *Pneumatic halls inflated at low pressure, 30 mb* require extra safety and ventilation measures. They are very quickly erected. They may be semi-transparent or opaque, with built-in

insulation. The new materials (pvc sheeting, insulated with poly-urethane foam) open up interesting possibilities as regards acoustic and thermal effects.

(d) *Experimental pneumatic structures.* These are erected with insulating membranes on low pressure pneumatic structures. They are not yet on the market but will take the place of present-day pneumatic halls, as they eliminate the latter's stability faults.

(e) *Structures suspended on a tubular skeleton.* Very low-cost insulating membranes are attached to three-directional metal arches permitting complete safety and very speedy erection. In view of their low cost-price, amortization is reduced thereby making the renewal of the materials possible. These structures make it possible to span long distances.

(f) *Structures suspended on cables.* Halls consisting of fixed membranes suspended on cables are more costly than the foregoing type but allow of unusual shapes which exert an increasing appeal on utilisers of the building. The spans may be of any length, illumination is difficult and of course various types of roofing can be used : plate steel, aluminium, modular plastic etc. according to the choice of the builder.

(g) *Variable membranes.* Variable membranes suspended on cables of the type used for the Carnot swimming-bath in Paris, offer the alternative of complete open air in periods of sunshine and extremely flexible protection in winter or between seasons.

III. *Influence of technical choices in sports buildings*

Given the possibilities set out above, one may say that no hard and fast rules can be laid down concerning methods of construction of sports halls : any of the processes can be used. Undoubtedly the criterion of durability may often be decisive, though some reservations are called for.

Above all, sports halls call for up-to-date construction processes, functional shapes adapted to playing areas, and diurnal lighting so that they can be integrated with their environment and brought alive.

Sanitary installations will almost always have to be permanently sited, but the arrangement of the play area should be flexible.

Floor tiers can be movable.

Correct acoustics are of prime importance, and will add to the comfort of utilisers.

Ventilation and heating should take account of the spatial architecture and never influence it but rather stress their functional purpose. The atmospheric conditions in sports or meeting areas are a fundamental feature ; they are linked with ventilation. Artificial lighting should be adaptable and very flexible in its distribution and intensity. It will have a wide function in multi-purpose halls (meetings, theatrical performances etc.).

The various low-cost methods of building sports halls differ greatly. It may be assumed that traditional structures will continue to exist for a long time yet. They answer the ordinary needs of certain regions lacking skilled labour where, by bringing in parts prefabricated in workshops, frameworks can be mounted on ready-built walls *in situ*.

Plastic structures should always be considered in the light of the architect's survey, the latter being related to the general context of the environment.

On the other hand, there is no doubt that the up-and-coming structures like the suspended membranes, mobile and tensioned membranes, and pneumatic structures with varying principles of support will satisfy the sporting and recreational demand for low-cost, medium-term halls.

The internal arrangements should be more flexible in such buildings.

Furthermore, within the context of industrialisation, it is just possible that future users may be induced to participate in the construction of their sports hall.

Since our needs change so rapidly, the successive generations that use these facilities are bound to make ever greater demands on architectural expression. Through publicity, this is becoming a permanent feature of social life.

In conclusion, contemporary society has considerable needs of which sport as an educational element in health and recreation is one. It is important that sports amenities, as places where people meet and make contact, should help to develop the aesthetic sense of the public. This is a factor which the architect cannot disregard when deciding on the choice of structural design.

2. MANAGEMENT

by J.A. Jeffery, DLC,
(Head of Physical Education Unit, Loughborough University of Technology,
Director of Loughborough Recreation Planning Consultants Limited)
and M.R. Fordham, MA, MSc, DLC,
(Physical Education Unit, Loughborough University of Technology,
Course Tutor - Recreation Management, Consultant)

A recreation manager working in a centre in the North of England wrote to us recently, worried by the fact that many people still thought of recreation as sport or physical activity. In his work, he said, he constantly came up against "concentrated pockets of interest—sports, arts, youth, entertainment, the elderly..." all of whom seemed to want little to do with each other. We share his concern, for this assumption that sport and physical recreation are the major components of recreation can be a dangerous one, especially if it is held by planners, managers or their employers.

To qualify as a game or a sport, an activity must be some form of contest, played according to rules and decided by skill, strength or luck. Recreation, on the other hand, is more than just sport—*it is experience*. It has been defined (Shivers) as the "new man" or the "ahh !" feeling that results from complete involvement in an activity. The characteristic quality of recreative experience is this absorption, which helps the individual to "re-create" himself through achieving or restoring a personal harmony or balance. This means, of course, that any activity is potentially recreational in its effect and that it can occur at any time, not only during leisure. While we must recognise the all-pervasive nature of recreative experience (work itself can be recreational !), as planners and managers we have, for practical purposes, to limit our attention to the provision and control of facilities for use in leisure time—the time left over after the demands of work and personal organisation have been met. If we are to believe the informed predictions, leisure time is to be an increasing feature of all of our lives. In consequence, the role of managers of recreation will become more crucial and their performance will be assessed against constantly rising standards.

Surveys of recreative activity in leisure time, however, show that for many, non-work time is still restricted or taken up by tasks directed towards economic ends. Even when leisure is given over to the pursuit of recreation, it is evident that sport, in all its forms, comes a poor second to television viewing, home decoration, car maintenance, or drinking and dancing !

We have drawn this distinction between sport and recreation, not to prove that sport is of minor importance, but to stress that it should be seen in its true perspective. *Sport for All* is a worthy concept, but only if it is expressed in terms of providing opportunity for all those who wish to engage in games and physical activities. It is patently clear that not everyone considers sport as a means of achieving recreation. For this reason, and as we exist in a world where all resources are scarce—especially those of money and materials—we must ensure that when we invest we do in fact attempt to meet real demand. *Our planning, therefore, must be for recreation.* If it is, we shall make effective increases in leisure time facilities, including those for sport, and be more likely to achieve the stated aim of *low cost provision.*

Our concern to arrive at accurate definitions may appear to be too theoretical, if not pedantic. It must be understood, however, that values and ideas determine the way we act, and for planners and managers of such a delicate and personal thing as other people's recreation, this represents a formidable challenge. Every act of recreative provision seeks to meet an existing demand. Yet, there is considerable evidence to show that when a new facility comes into existence, it generates a demand of its own. People use it because it is there ! So in deciding what to provide, the planner not only attempts to satisfy, he also begins to control, indeed to manipulate people's choice. Planning decisions, therefore, must be based on a sound philosophy of recreation and clearly understood objectives. It has been said that there is nothing so practical as a good theory. We agree. Theory, definitions and objectives are practical necessities if we are to extend rather than restrict freedom of choice in recreation.

If we must plan for *recreation*, it is doubtful if we can afford to continue to think in terms of providing sports halls. The perspective must be widened to that of recreation or leisure halls—facilities designed to cope with recreational rather than sporting variety.

Leisure halls will have different objectives, and different objectives mean different design and different management requirements.

This difference, however, will only be achieved if the planning process is adequate. *Planning, to be effective, must recognise that there is an essential and dynamic relationship between object-*

ives, design and management. All too often, planning and even building is completed before management is either consulted or appointed. Sequential planning of this sort—a series of linked but separate decisions—is unlikely to save money and may well fail to meet its ultimate objectives. We quote one example from many we have seen. In one large centre in Britain, over £5,000 had to be spent by the newly appointed manager to get it into operating order, after the architect had handed it over to him, as a completed £1 m facility !

The leisure hall, even more than the sports hall, has to be built with flexibility of use in mind. *Multi-purpose use has, of course, no inherent value—it is a compromise forced upon us by limitations of money and land.* In an ideal world every recreative activity would be housed in its own special facility. There is some evidence in Britain to suggest that inadequate multi-purpose provision has forced some of the wealthier organisations to build special facilities for their own use. High standard specialist facilities are required for the highest levels of recreative activity, whether this be sport, drama, music, entertainment or art. However, this can never be the solution to general recreation provision. We have to seek effective compromises and these will result only if it is understood that multiple use can be introduced in a number of ways. A facility can be planned :

1. to cater for a range of similar activities, some of which can go on at the same time (e.g. a large sports centre) ;

2. to provide a range of similar activities, but not at the same time (e.g. a one-court sports hall) ;

3. to accommodate a range of different recreative activities, some of which can go on at the same time (e.g. a large recreation or holiday centre, providing for sport, entertainment, drama...) ;

4. to house a range of different recreative activities, but not at the same time (e.g. a small community hall).

Size, of course, will be a major factor in deciding how multi-purpose a facility can be and there is much to be done to decide what are the most effective sizes and shapes of recreation facilities. Outdated standards are still the root cause of much bad planning. However, more serious deficiencies result from planners seeking to provide facilities of types 1 and 3 above, and yet in the end offering only 2 or 4. Many instances can be quoted of areas, set aside for quiet activities, being unusable because of insufficient screening or insulation, or of incompatible activities being scheduled for the same open space. *These errors result from the planner not thinking as a manager or in management terms.* They can be avoided, or at least minimised, by developing a logical and soundly based planning process.

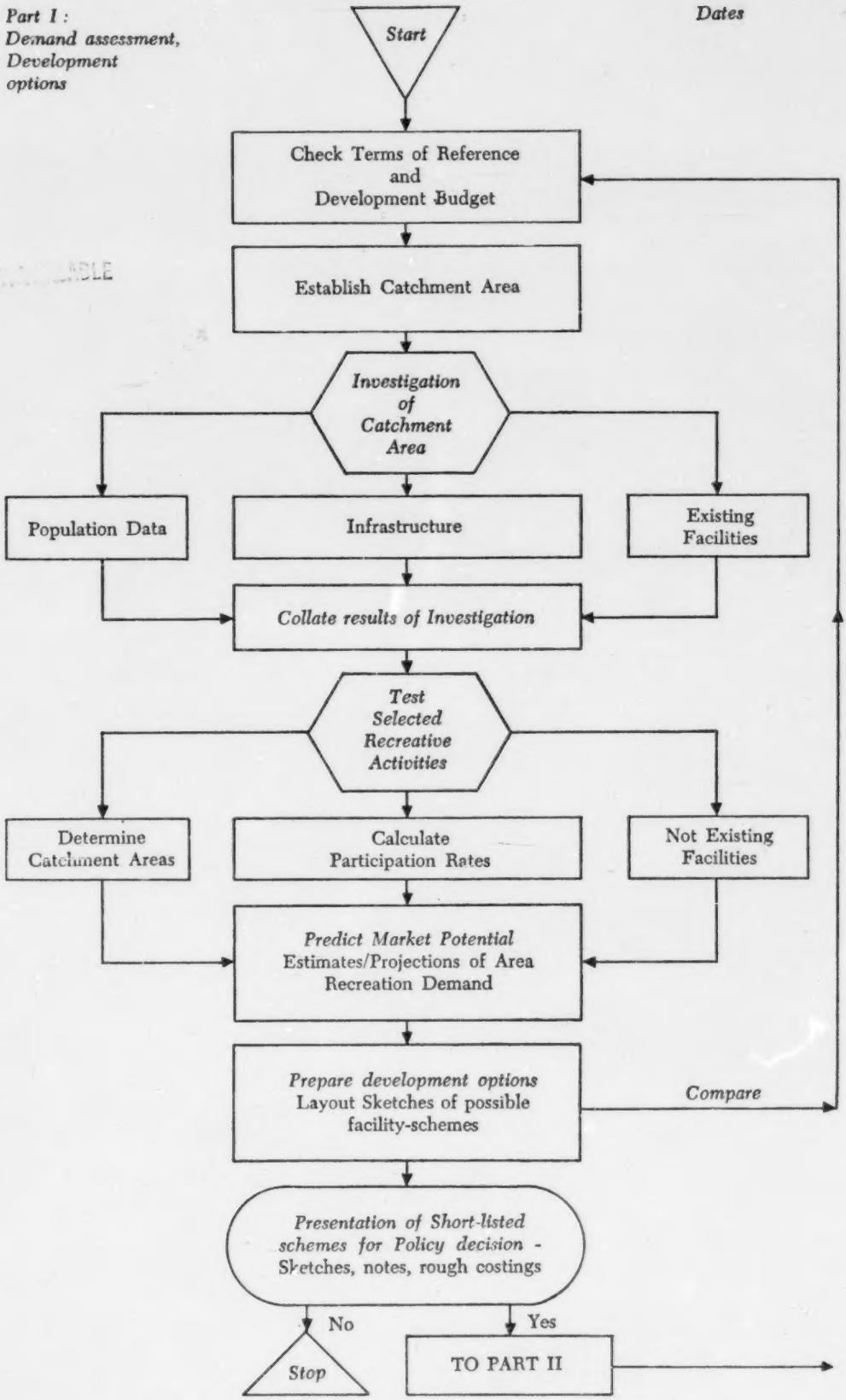
Design must stem from properly formulated objectives and be conditioned by management requirements. The way in which objectives and management needs must be allowed to control planning and construction can be illustrated. From the initial drafting of objectives, development is towards the production of a "concrete" physical solution to satisfy their requirements. Once the objectives are clear, the first task is to assess the demand potential of the user-population. This is done through an investigation in the catchment area chosen of such factors as population characteristics (socio-economic grouping, age ranges...), the infrastructure (communications, topography and services...) and the nature and use made of existing facilities. Once the results of this investigation are known, initial ideas on provision can be drawn up in the form of alternative layouts, in rough sketch form. These schemes—the development options—have to be tested against the initial objectives and available finance. This testing determines whether the facility should be built at all and also selects which is the best plan to adopt. *This process begins and ends with objectives.* The objectives themselves are not rigidly applied. It sometimes happens that as a result of experience gained in planning the initial objectives are modified or re-defined. This is as it should be—for effective planning is a dynamic relationship between key variables and must be sensitive to feedback.

This procedure is illustrated through a flow or logic diagram.

It will be difficult for a planner to think like a manager—he has not been trained to do so. The obvious solution is to have a multi-disciplinary planning team on which management expertise is represented. Alternatively, the manager should be appointed at the commencement of the planning of a new facility (a view often voiced by managers but rarely put into practice by their employers). This implies, of course, that there *is* a management expertise that is of sufficient importance to be taken into consideration by highly trained and professional men such as architects, engineers and planners. Unfortunately, management training of any sort is a relatively new feature of European education and measures have only just begun to improve the training and status of recreation managers. Except for companies who have a purely commercial interest in leisure and

Part I :
Demand assessment, Development options

Dates



Part. II :
Physical planning,
Profitability
estimates

Dates

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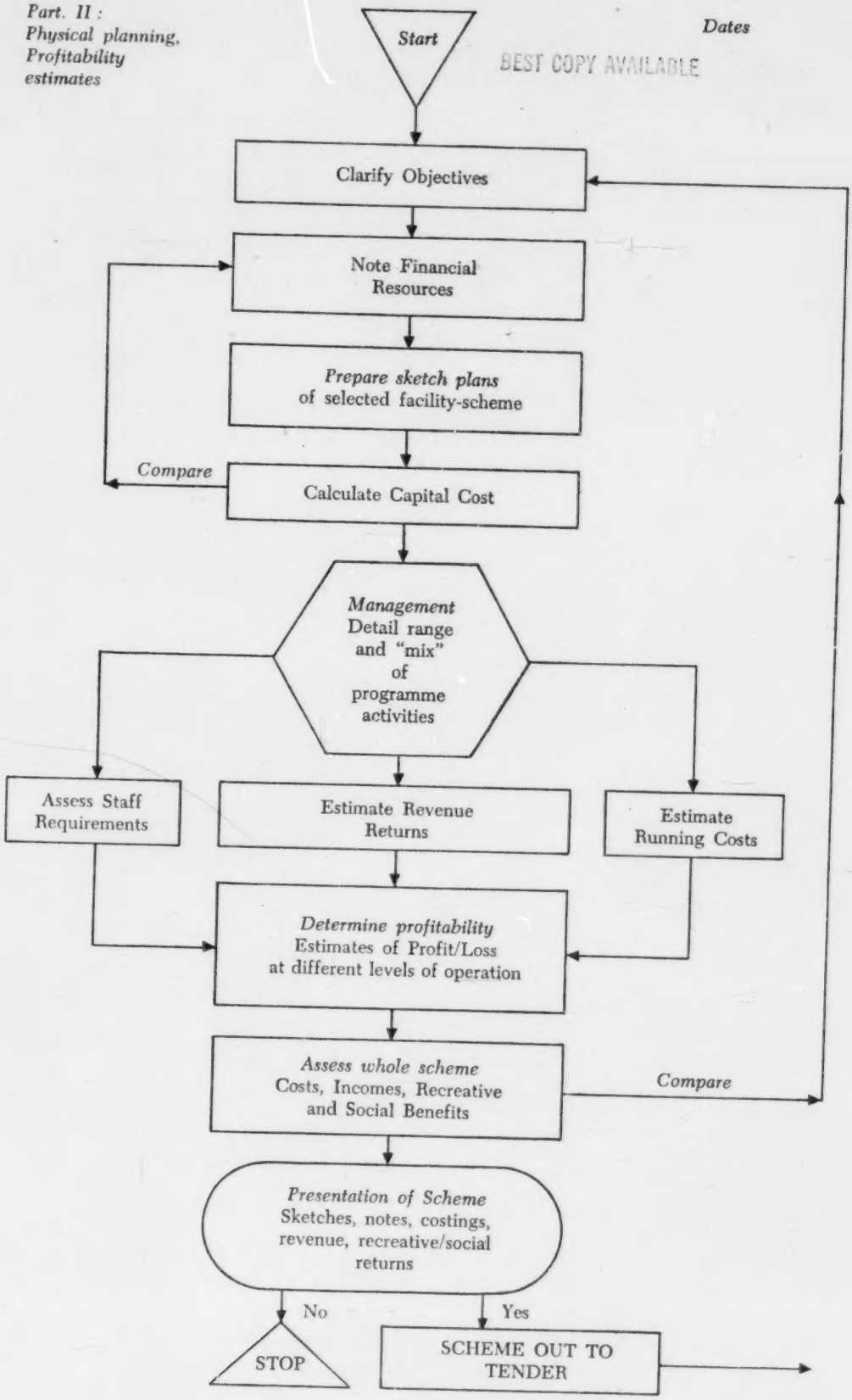

where management is profit-centred and therefore akin to that of any other service industry, management tends to be in the hands of technical specialists. So, we have engineers in charge of swimming pools, horticulturalists controlling parks and physical educationists in charge of sports centres. We do not intend to decry these very important skills, but it must be made clear that *they are not management skills*, and all too often this is only too apparent. Adequate management performance in recreation will be achieved only if there is adequate training. As yet few training courses of any real consequence exist.

In an attempt to remedy this situation, Loughborough University of Technology launched a Masters Degree course in Recreation Management in October 1969. The first ten students have just completed their course and are beginning their new jobs in recreation centres, community work, planning and consultancy. The second course of a dozen students has just assembled, being drawn from education, local government, architecture, advertising, investment and professional sport. The aim is to equip them to take up senior posts in the expanding area of leisure provision and management. Another course, sponsored by the Sports Council, and leading to a Diploma in Recreation Management, is due to begin in January 1971. It is hoped that these initiatives will lead eventually to a whole range of training courses, directed towards different levels and career stages.

In preparing for the course at Loughborough, it was necessary to undertake research into the management task in recreation and to make an attempt to isolate the special skills that were required in the various roles. This was the only basis on which an effective training course could be developed. The findings of this work can be indicated.

Anyone responsible for the work of others is a manager. He is commonly seen as one directing, motivating and controlling subordinates, within an agreed framework of objectives and accountable to certain success criteria. All managerial jobs require a particular expertise, which varies according to the job and the level at which it is held. However, apart from technical knowledge, the manager also needs additional skills that are entirely managerial in character. These, the so-called functions of management, can be summarised under three main heads :

Planning : deciding what to do ;

Execution : deciding how to do it (division of work, allocation of resources...) and getting it done (motivation of staff, organisation...) ;

Control : seeing that the work has been done in accordance with the initial plans and checking to see if modifications are required, as a result of the passage of time.

Specialist experience and a high level of technical competence in a job does not necessarily also confer the ability to manage others in it. Management skills, while being intimately related to technical requirements, are *additional—something extra !*

Most management education is based upon the view that there is a developing body of knowledge on management, which can be studied with profit by managers or those who wish to move into executive positions. It is assumed that this information, once it is acquired, can be applied in any management situation. In other words, managerial skills are transferable and a good manager can be expected to manage anything. So we find that most courses have a similar collection of subjects—the so-called common core of management—i.e. economics, statistics, organisation theory, law, marketing, computers, operations research...

However, within the last ten years or so, empirical research carried out in Britain has examined this view of a generally applicable "administrative science" and found it to be rather facile. Although on the surface certain managerial functions like financial control, staff organisation, buying, building maintenance etc. appear to be the same, regardless of the context in which they are practised, in fact there are certain features, peculiar to the working environment, the organisation's objectives and to the technical knowledge and skills required in the job, that make these functions particular and specific. In other words, the place of work, the purposes for which the organisation was set up, the technical job requirements and the size of the organisation, act as both constraints and conditioners of the manager's work. *Managers' jobs are seen to be different.* The research workers conclude that it is these differences that are more important than the apparent similarities and that training must recognise and cope with them, by adapting rather than "swallowing whole" the common core management subjects.

Recreation management training must adapt the common core of management to its particular needs. The skills that must be developed through training are best illustrated through an input/output model.

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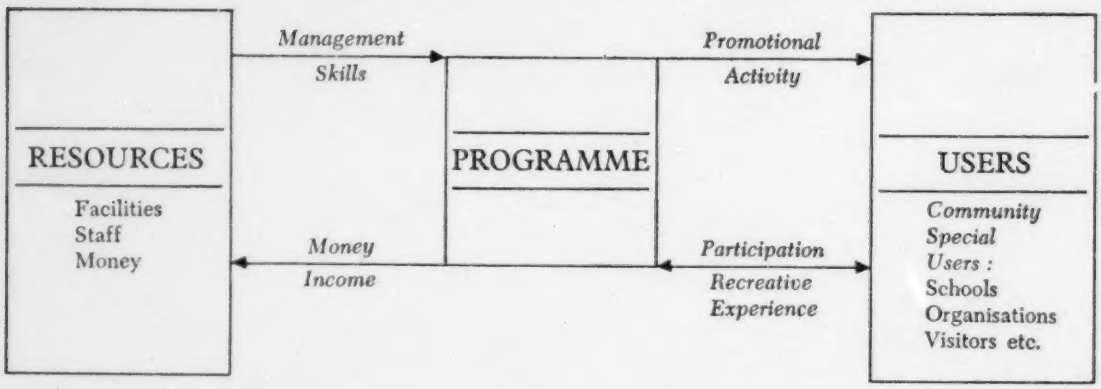
RECREATION MANAGEMENT : INPUT/OUTPUT MODEL



Basic resources such as facilities, trained managerial and operative staff and necessary finance are worked on by the main input of management skills brought in by the senior manager. The foundation of these management skills is a recreation philosophy ; an understanding that recreation is experience and that this has direct implications for managerial policy. A manager's action and performance will be less than adequate if it is not informed by an appropriate theoretical orientation.

Using the theoretical base, the manager's main input is his programme. This draws upon his knowledge of the user catchment area (through research), of recreative patterns (training, experience and research) and his sensitivity to local needs. The programme is itself limited by available facilities, by the level and training of staff and by the amount of servicing finance. The good manager has a knowledge of facilities, not only in matters of planning and maintenance, but also in the optimum use of areas, equipment and teaching of ancillary staff. Promotional activity has to be undertaken to "broadcast" the services being offered to the user, and this could involve a wide range of media : from static forms such as notices, posters and advertisements, to more dynamic methods such as special events, TV and radio appearances and fund raising activities. To these specialist recreation skills must be added general management : planning, implementation of policies (staff, finance, motivation, communication etc.) and control (checking and monitoring performance).

The Loughborough Masters Degree course has attempted to modify management knowledge to the needs of the executive in recreation, as outlined above.

It is not enough to plan and build low-cost recreation facilities. We must ensure that they are designed to meet a need that does or is likely to exist, that they are sited within reach of potential users, and above all, that once they are built they can be managed economically and in accordance with their stated objectives. The facilities that we provide are there with the express purpose of allowing the users to seek recreative experience. If our planning process does not allow this objective to control our thinking, then any savings that we make at the capital cost stage are purely illusory.

PART II

CONCLUSIONS

1. **Conclusions adopted**

2. **Assessment of the Amsterdam Course,** by D.H. Schmüll

1. CONCLUSIONS ADOPTED

1. *The function of a sports hall*

The function of a sports hall is first and foremost to make possible participation in sport in all its different facets ; so it must cater for competitive sport and for *Sport for All* while also providing room for social contact. This means that functionality must be the guiding principle in the building of a sports hall. This may in turn mean that additional, smaller-scale facilities should be available to accommodate indoor sports and the individual practice of sport.

Where it is considered desirable, the provision of additional accommodation for other social and cultural activities can also be contemplated. In many cases in addition to its functionality for competitive sport and *Sport for All*, the possibility of schools using the sports hall should also be taken into account. Allowance should also be made for its use by the handicapped. A final point to be reckoned with is the admission of spectators.

2. *Sport for All*

Sport for All is an integral part of the overall sports scene. It will depend on the situation in each individual country whether sports organisations or public authorities take this aspect of sport in hand. It will be necessary in some cases to introduce training schemes for instructors, and here it will depend on the inclination of the individual instructor whether he goes in for competitive sport or recreational sport. There should be professional as well as voluntary staff. Which body is responsible for the training will again depend on the situation in the country concerned. It is in any case essential that there should be co-operation between public authorities and the private sector.

As regards *Sport for All*, due account must be taken of the fact that it can be organised both within the framework of sports organisations and independently. In either case it is desirable that participants should make a reasonable financial contribution. In drawing up the schedule of functions of sports halls, due provision must be made for *Sport for All*—irrespective of membership of a sports association.

3. *The public authorities*

Sports facilities should be provided by public authorities, with due regard to the following factors :

1. Sports experts should be consulted when the planning details are being drawn up.

2. Besides determining present needs, it is essential to anticipate future trends, with due regard to general policy and a good range of facilities.

3. Sports halls should have great flexibility ensuring a wide range of uses. Every effort must be made to keep maintenance costs low.

4. It is desirable to have a ground next to sport halls for open-air sport and possibly a swimming-bath as well.

5. Sports halls should be sited in easily accessible locations.

6. Public authorities should not allow economic considerations to relegate a hall's sporting function to second place, although it is quite conceivable that in some countries other types of activity may have to be organised in sports halls. Even then, the hall's construction should be based on the stipulations of sports experts.

7. It is considered in some countries that investment in sports halls is justified if calculations point to an at least 80 % capacity use.

4. *Technical problems*

1. The primary consideration underlying every decision should be the interests of the athletes and especially the avoidance of potential dangers.

2. The Council of Europe should urge international sports federations not to introduce changes of measurement, unless there are pressing reasons for doing so, especially if it will entail higher costs.

3. Before any further action, it is desirable to form working parties to study the technical problems relating to sports halls in closer detail as follows :

(*a*) A comparative scientific survey of different types of existing floors could result in a number of recommendations. Here athletes should be consulted ; if the floor of a sports hall does not have a certain degree of resilience it can present dangers.

(*b*) A survey should also be conducted on the possible economic, physiological, and psychological consequences of using a hall without daylight.

(*c*) As regards artificial lighting, it is desirable to make a study of low-cost but efficient systems.

(*d*) Desirable standards in regard to air-conditioning, temperature, speed of air circulation, degree of humidity and acoustics have to be established. A special symposium could perhaps be organised for this purpose.

(*e*) It is necessary to make a survey of the profitability and possible adaptations of temporary, permanent and "dispensable" sports halls.

It is perhaps desirable that the above-mentioned studies be entrusted to the *Internationaler Arbeitskreis für Sportstättenbau* (IAKS), to which the Council of Europe might give its support. As far as lighting is concerned, co-operation with the International Commission on Illumination is desirable.

4. An information centre, where experiences can be exchanged, should be set up.

5. When building a low-cost sports hall, local needs must be the criterion for the kind of sports facilities to be provided. However it may not always be possible to satisfy all dimensional requirements.

6. As far as possible, it is however desirable to try to abide by the minimum official measurements for competitive events. It is mainly in this context that continual alterations of these measurements impede the attempt to construct low-cost sports halls.

7. Standard construction of the same type of sports hall should be encouraged as this can reduce costs.

8. The main endeavour in all the foregoing recommendations must be to create suitable conditions for the athlete.

9. To achieve the latter, there must be interaction between the architect and athletes.

10. The design of a sports hall should be based on its schedule of functions. It is the architect's task to solve any problems that this may imply.

11. As regards lighting, it must be remembered that not all sports require the same lighting, so it is difficult to lay down definitive standards. What is essential is that the light should be well distributed.

12. More intensive use of sports halls can be achieved by inserting partitions. A study should be made to determine how they may be used to best effect.

13. Experimentation is needed in the construction of sports halls provided its aim is the development of cheaper and more attractive sports halls.

14. Every country should have a central institute where data and experience concerning the construction of sports halls can be collated.

15. Flexibility as regards space and floor surface is important, though the design should be based on current requirements.

5. *Management*

1. In the economic management of sports halls, sport should remain the most important element, though other activities should not be overlooked.

2. Economic management should also extend to subsidiary sectors of the premises.

3. The economic structure must be geared to the prime function of the sports hall.

4. Management should not be based primarily on a purely commercial approach but be aimed at providing opportunities for *Sport for All*.

5. A working party to study management and organisation is desirable.

6. *General remarks*

1. When discussing culture, sport and culture should not be referred to as separate entities, since sport is, in itself, a valuable cultural activity.

2. Discussion of the concept of recreation makes little sense if no one quite knows what is meant by the term. It might be advisable to analyse this concept in terms of considering the best ways of organising leisure pursuits, the type of premises that would be needed and the nature of the training and function of recreation leaders.

3. Every country should conduct regular surveys to find out how the population spends its leisure time. From these it should be possible to deduce what activities require the most attention. This is essential for the shaping of any national policy on recreation.

2. ASSESSMENT OF THE AMSTERDAM COURSE

by D.H. Schmüll

Reviewing the work of a conference means examining the many lines of thought which emerged from the speeches and the discussions. It also means detaching oneself from one's own ideas and subordinating oneself to those of the whole group, which is very difficult. We all arrived armed with the experience acquired in our own countries and on our return find the situation just as we left it. It became apparent during our discussions that this situation varies a great deal from one European country to another. We also realised that social conditions, individual relationships, geographical location and many other factors have a considerable bearing on what we regard as ideal for our countries.

For that reason no definite guidelines can be laid down, so we have to try to translate what we heard not only into our own languages but also into recommendations suited to our own environments. Therefore, when considering the reports, we must be careful not to impose our own viewpoint and often content ourselves with compromises based on the experiences of other people who are not acquainted with the situation in our own particular country.

A strong plea was made for objective research. However, objectivity is itself a relative concept, since the facts on which it is based must be seen in relation to events, people and the culture those people have created—if objectivity is not to be something completely lifeless. In short, when formulating so-called objective theories we shall always come up against the demands made by the community.

I know that science claims to conduct purely objective research in all fields, and this holds good for all fields in which technology has the upper hand. The spectacular development of the computer is a good example of this. However, as soon as *man* has priority, science gets into difficulties, for it can never free itself of its natural shackles. The scientist is imprisoned within the confines of his own mind from which his theories emanate. That is why he turns increasingly to the machine in order to extend the scope of his thinking. And the machine helps him to find solutions to problems he never even imagined existed. We are exploring the universe in air space machines which we would never have been able to control without the aid of computers. The machine performs calculations and produces answers, which man can use—often without understanding them—to widen his horizons.

And now we come to the heart of the problem.

Faced with the problems that can be solved only by human understanding and brotherly love, machines, figures and calculations inevitably fail.

I have yet to meet a father trying to calculate by computer why one of his sons refuses to study, wears indescribable clothes and wants to go into films while his other son, with the same upbringing and education, accumulates all manner of academic qualifications, wears a dark suit and considers banking to be the ideal career. I am speaking now from personal experience.

During the course of Amsterdam we ventured into a field where understanding and knowledge go constantly hand in hand.

In our society, science is necessary and it would be unrealistic to deny it.

Man can—or rather, should—turn to science for results, since concrete achievements and results are the two pillars on which our Western technocratic culture reposes.

Research on lighting, air conditioning, acoustics and design is necessary, but we must never lose sight of the fact that its objective is to serve the individual, that is, an ultimate purpose which we cannot compute but merely understand.

Things become more complicated when we enlist the aid of medical science. It is possible to calculate the right pulse rate for a given activity. It is possible to calculate how much energy is released in making given movements. It is possible to lay down laws regarding the relative tension between bones, tendons and muscles. But in every case we shall have to contend with purely human movement which cannot be broken down in terms of balance, leverage and pure speed.

But the real problems begin when we come to the social sciences. Extensive research has been carried out in the spheres of behavioural science, andragogy, social psychology and group sociology. The results of this work are such that it is difficult to draw any concrete conclusions, so that most sports coaches fall back on their own experience, intuition and what they learn every day from their pupils. It is a very good thing that this conference stressed the need for research, for the universities would have difficulty in selecting subjects for research without the guidance of the sports world which is, after all, at the centre of the problem.

Let me venture some suggestions in our own particular field :

Is the shape of a sports hall related to the sense of space needed by players of a given sport ? Any volleyball player knows what it is like to play in an open-air tournament after a whole season of indoor play.

Is the composition of the floor related to the rules of indoor basketball, tennis, handball and eurhythmics and if so—this was brought out clearly in our work—what differentiations should be made in training methods for these different sports, not only from the point of view of safety but also from that of technique, group tactics and dynamics ? Is the inter-relationship of a group of players or dancers related to the size of the hall, its lighting or acoustics ? Is it related to the way in which spectators are positioned round the ground ?

The speakers on this course clearly demonstrated that the sports hall is a world of noise, light and shapes in which the human mind, while playing, must find its way. Science can help us, giving us figures and in many cases, temporary solutions, but before he can start his work, the coach will have to translate the language of science into that of methodology and didactics which has hitherto been based on experience and intuition. Experience and intuition are not enough on their own because the Western mentality needs statistical calculators in order to compare data needed for methodological purposes.

That is why research is needed by teams of experts from almost every university faculty as well as people with practical experience who are in daily contact with players. Science should then be aware of its own limitations and the practical experts pay careful attention. It is vital that the player should not feel like a robot but take pleasure in movement, games and contact with his fellows.

If the Council of Europe succeeded in forming such teams, arranging symposiums and duly publicising the findings of such research in the appropriate quarters, sport would take a great step forward.

Science exists to serve mankind and not for its own sake. In this context, one of the first demands we can make on science is that it should study how social contact may be intensified. Social contact is one of the cornerstones of culture which always stems from communities and never from individuals.

During the course, frequent reference was made to the need for social contacts : contact on the "field" and in communal meeting-places before and after play. The general consensus of opinion was that these areas should be separate from those in which sport took place. And this brings us back to the problem of the relation between people at recreation and the space around them, especially if the recreational activity is something other than sport.

A player is active in a thousand and one ways—moving, listening, seeing, observing, and in each of these activities he should experience a different sense of space—not to speak of lighting, temperature and acoustics.

Another point that emerged was the importance of distinguishing between sport within the organised framework of sports associations and sport outside such a framework. And here the importance of the non-organised sport was particularly emphasised. Throughout the discussions the view was taken that the functional character of the sports hall in relation to the player and his game—in short, to man himself—should take precedence over technical or economic considerations.

In the context of low-cost sports halls, it is hard to find a place for top-level competitive sport, attracting numerous spectators, quite apart from the specific demands of this type of sport. But there are distinctions to be drawn between competitive sport at a lower level—which quite often also attracts large numbers of spectators—sports training and recreational sport.

During the course, these distinctions were defined in different ways, in the light, no doubt, of the situation obtaining in the individual countries. For it is possible that the evolution of sport may have reached a point in a particular country where it is regarded as a means of therapy or even as an antidote.

It is also possible that recreational sport may provide the first step towards recruitment to top-level sport. Between these two extremes there are all sorts of possible shades of difference with consequent implications for the construction and planning of sports halls.

Organisation of sport—whether it be competitive or recreational—should be adapted to circumstances in the individual country, for example, over the question whether responsibility for sports activities should rest with private enterprise or the State.

Whatever views are taken, the well-being of people in their leisure time should always be the decisive factor when measures of a technical or economic nature are required.

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PUBLICATIONS OF THE COUNCIL FOR CULTURAL CO-OPERATION

EDUCATION IN EUROPE

Section I — Higher education and research

Engineering Education (1964) (out of stock)
The Teaching of Chemistry at University Level (1966)
The Structure of University Staff (1966)
How to Qualify as a "Biologist" in the Universities of Europe (1967)
The Teaching of Physics at University Level (1967)
The Teaching of Geography at University Level (1968)
The Teaching of Economics at University Level (1970)
The Teaching of Mathematics at University Level (printing)
The Screening of Students (1970)

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